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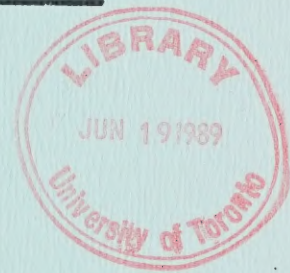


# ENVIRONMENTAL ASSESSMENT BOARD

VOLUME: 110

DATE: June 7th, 1989

BEFORE:  
M.I. JEFFERY, Q.C., Chairman  
E. MARTEL, Member  
A. KOVEN, Member




FOR HEARING UPDATES CALL (TOLL-FREE): 1-800-387-8810

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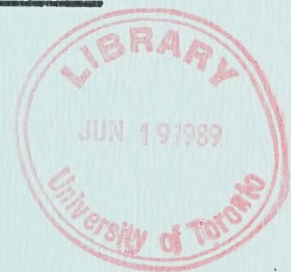


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HEARING ON THE PROPOSAL BY THE MINISTRY OF NATURAL  
RESOURCES FOR A CLASS ENVIRONMENTAL ASSESSMENT FOR  
TIMBER MANAGEMENT ON CROWN LANDS IN ONTARIO

IN THE MATTER of the Environmental  
Assessment Act, R.S.O. 1980, c.140;

- and -

IN THE MATTER of the Class Environmental  
Assessment for Timber Management on Crown  
Lands in Ontario;

- and -

IN THE MATTER of an Order-in-Council  
(O.C. 2449/87) authorizing the  
Environmental Assessment Board to  
administer a funding program, in  
connection with the environmental  
assessment hearing with respect to the  
Timber Management Class  
Environmental Assessment, and to  
distribute funds to qualified  
participants.

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Hearing held at the Ramada Prince Arthur  
Hotel, 17 North Cumberland St., Thunder  
Bay, Ontario, on Wednesday, June 7th,  
1989, commencing at 9:00 a.m.

-----

VOLUME 110

BEFORE:

MR. MICHAEL I. JEFFERY, Q.C.	Chairman
MR. ELIE MARTEL	Member
MRS. ANNE KOVEN	Member



A P P E A R A N C E S

MR. V. FREIDIN, Q.C.)	MINISTRY OF NATURAL
MS. C. BLASTORAH )	RESOURCES
MS. K. MURPHY )	
MS. Y. HERSCHER )	
MR. B. CAMPBELL )	MINISTRY OF ENVIRONMENT
MS. J. SEABORN )	
MR. R. TUER, Q.C.)	ONTARIO FOREST INDUSTRY
MR. R. COSMAN )	ASSOCIATION and ONTARIO
MS. E. CRONK )	LUMBER MANUFACTURERS'
MR. P.R. CASSIDY )	ASSOCIATION
MR. J. WILLIAMS, Q.C.	ONTARIO FEDERATION OF
MR. B.R. ARMSTRONG	ANGLERS & HUNTERS
MR. G.L. FIRMAN	
MR. D. HUNTER	NISHNAWBE-ASKI NATION and WINDIGO TRIBAL COUNCIL
MR. J.F. CASTRILLI)	
MS. M. SWENARCHUK )	FORESTS FOR TOMORROW
MR. R. LINDGREN )	
MR. P. SANFORD )	KIMBERLY-CLARK OF CANADA
MS. L. NICHOLLS)	LIMITED and SPRUCE FALLS
MR. D. WOOD )	POWER & PAPER COMPANY
MR. D. MacDONALD	ONTARIO FEDERATION OF LABOUR
MR. R. COTTON	BOISE CASCADE OF CANADA LTD.
MR. Y. GERVAIS)	ONTARIO TRAPPERS
MR. R. BARNES )	ASSOCIATION
MR. R. EDWARDS )	NORTHERN ONTARIO TOURIST
MR. B. McKERCHER)	OUTFITTERS ASSOCIATION
MR. L. GREENSPOON)	NORTHWATCH
MS. B. LLOYD )	



APPEARANCES: (Cont'd)

MR. J.W. ERICKSON, Q.C.)	RED LAKE-EAR FALLS JOINT
MR. B. BABCOCK )	MUNICIPAL COMMITTEE
MR. D. SCOTT )	NORTHWESTERN ONTARIO
MR. J.S. TAYLOR)	ASSOCIATED CHAMBERS OF COMMERCE
MR. J.W. HARBELL)	GREAT LAKES FOREST
MR. S.M. MAKUCH )	
MR. J. EBBS	ONTARIO PROFESSIONAL FORESTERS ASSOCIATION
MR. D. KING	VENTURE TOURISM ASSOCIATION OF ONTARIO
MR. D. COLBORNE	GRAND COUNCIL TREATY #3
MR. R. REILLY	ONTARIO METIS & ABORIGINAL ASSOCIATION
MR. H. GRAHAM	CANADIAN INSTITUTE OF FORESTRY (CENTRAL ONTARIO SECTION)
MR. G.J. KINLIN	DEPARTMENT OF JUSTICE
MR. S.J. STEPINAC	MINISTRY OF NORTHERN DEVELOPMENT & MINES
MR. M. COATES	ONTARIO FORESTRY ASSOCIATION
MR. P. ODORIZZI	BEARDMORE-LAKE NIPIGON WATCHDOG SOCIETY
MR. R.L. AXFORD	CANADIAN ASSOCIATION OF SINGLE INDUSTRY TOWNS
MR. M.O. EDWARDS	FORT FRANCES CHAMBER OF COMMERCE
MR. P.D. McCUTCHEON	GEORGE NIXON



(iii)

APPEARANCES: (Cont'd)

MR. C. BRUNETTA

NORTHWESTERN ONTARIO  
TOURISM ASSOCIATION



I N D E X   O F   P R O C E E D I N G S

<u>Witness:</u>	<u>Page No.</u>
<u>J. JOSEPH CHURCHER,</u>	
<u>EDWARD ISKRA,</u>	
<u>ROBERT A. CAMPBELL,</u>	
<u>PETER PHILLIP HYNARD,</u>	
<u>ROBERT L. GALLOWAY,</u>	
<u>MICHAEL EDWIN BUSS,</u>	
<u>CINDY STERN KRISHKA, Resumed</u>	18264
Continued Direct Examination by Ms. Murphy	18264
Direct Examination by Mr. Freidin	18343



I N D E X   O F   E X H I B I T S

<u>Exhibit No.</u>	<u>Description</u>	<u>Page No.</u>
630	Document entitled: A Generalized Illustration of Plant Communities Succession, Including Tolerant Hardwood Climax Stage.	18306
631	NAN Interrogatory Question No. 4 to Panel 12.	18307
632	OFIA/OLMA Interrogatory Nos. 6, 7, 8, 13, 19 and 29; Ministry of the Environment Interrogatory Nos. 5 and 8; and Forests for Tomorrow Interrogatory Nos. 17, 18, 21 and 30 and answers thereto. (Panel 13)	18338
633	Hard copy of five overheads to be used by Mr. Churcher in his evidence-in-chief.	18339
634	Amended page 107 of the witness statement for Panel 13.	18339
635	News Release issued by the Minister of Natural Resources dated May 7, 1985.	18420
636	News Release by the Minister of Natural Resources dated February 13, 1986.	18420
637	Hand-drawn graph by Mr. Churcher showing the effects of a spray on the larval population.	18437



1 ---Upon commencing at 9:05 a.m.

2 THE CHAIRMAN: Thank you. Be seated,  
3 please.

4 Ms. Murphy?

5 MS. MURPHY: Good morning. I have an  
6 inquiry actually from Panel 14 who are getting ready to  
7 put in their evidence.

8 As I understand it, Mr. Chairman, there  
9 was some information about potential time for  
10 cross-examination of this panel and I would like to  
11 ensure that my understanding is correct and find out  
12 whether the Board has heard from any of the parties.

13 I understand that OFIA has said that they  
14 would be about one day or less, that OFAH I think  
15 indicated that they might be one day, and that Ms.  
16 Seaborn expects to be less than half a day.

17 And I wonder if the Board has heard from  
18 anyone else and if we can get an estimate from Forests  
19 for Tomorrow?

20 THE CHAIRMAN: Mr. Castrilli, do you have  
21 any idea how long you might be in cross?

22 MR. CASTRILLI: Yes, Mr. Chairman. For  
23 this group of seven, less than a day.

24 THE CHAIRMAN: Thank you. And I don't  
25 think we heard from Mr. Hunter.

1 MS. MURPHY: Thank you. That's helpful.

2 THE CHAIRMAN: Or Mr. Edwards or Mr.

3 Reilly or Colborne or any of the others.

4 MS. MURPHY: A couple of other  
5 preliminary matters. With respect to Exhibit 621, that  
6 is the exhibit that - I don't think you need to go to  
7 it right now - but that's the exhibit that responded to  
8 an inquiry about injuries. That document was prepared  
9 last week to respond to recent interrogatories, and I  
10 am advised now that the document requires a couple of  
11 corrections and I just wanted to let you know that that  
12 will be available shortly.

13 Ms. Krishka also advises that there  
14 should be a correction made to the table that is  
15 attached to Exhibit 627, that was an interrogatory from  
16 Forests for Tomorrow. And perhaps if you have that  
17 handy, she can just advise what those corrections  
18 should be.

19 MS. KRISHKA: At the very bottom --

20 MS. MURPHY: Do you just want to wait  
21 until we make sure they have it.

22 MS. KRISHKA: At the bottom of the table  
23 where the report that is listed by Wilcox, 1979, I  
24 would like to begin at the far left side.

25 The species was white spruce, location

1 was Ontario. The third column that says "stand age at  
2 treatment", it says "seedlings", it should read  
3 "various". That is because there was more than one  
4 treatment.

5 The method of cleaning was manual. The  
6 numbers of years post-treatment when assessed says "28  
7 years". The treatment there would have been planting,  
8 so it was 28 years after planting.

9 The post-treatment volume per hectare for  
10 the control that reads "76.6", should read "40.7". The  
11 next column for the treated that reads "189.9", should  
12 read "166.8". And the per cent volume change that  
13 reads "plus 148 per cent" - 148 per cent - should read  
14 "plus 410 per cent".

15 J. JOSEPH CHURCHER,  
16 EDWARD ISKRA,  
17 ROBERT L. GALLOWAY,  
18 ROBERT A. CAMPBELL,  
MICHAEL EDWIN BUSS,  
PETER PHILLIP HYNARD,  
CINDY STERN KRISHKA, Resumed

19 CONTINUED DIRECT EXAMINATION BY MS. MURPHY:

20 Q. Now, we are going to carry on and,  
21 Ms. Krishka, I understand that you wanted to clarify  
22 one matter that you were dealing with yesterday and we  
23 are going to be going back to one of the earlier  
24 overheads.

25 MS. MURPHY: The overheads, as you will

1 recall, Mr. Chairman, are Exhibit 623 and for the  
2 purposes of the record we will be looking at Exhibit  
3 623, page D, and I think we are going to have to get  
4 someone to look after the lights.

5 MR. FREIDIN: You did too good a job, Mr.  
6 Thornton.

7 MS. MURPHY: I feel like I am at a party.

8 THE CHAIRMAN: Ms. Murphy, Mrs. Koven is  
9 having difficulty writing when the lights are dim when  
10 we have the projector on. We are wondering if we might  
11 take that lamp at the far corner.

12 MS. MURPHY: That is a good idea. Why  
13 don't we just go off the record for a minute and move  
14 that lamp. That will probably be very helpful.

15 ---Discussion off the record

16 THE CHAIRMAN: I'm wondering if we might  
17 get the other one. Can you get the other from there.

18 Just one moment, we are getting the other  
19 one for Mr. Martel. This is the Board's sound and  
20 light show this morning. It gives it sort of a homey  
21 atmosphere; doesn't it?

22 MS. CRONK: That's right.

23 MS. MURPHY: Q. All right, let's begin.  
24 We are looking at Exhibit 623 at page D and that  
25 overhead was entitled: Common Objectives of Herbicide

1 Studies. And I understood you wanted to clarify  
2 something?

3 MS. KRISHKA: A. Yes. I had described  
4 that common objectives of herbicide studies were to  
5 identify optimum application rates and application  
6 timing and I just thought it would be useful to clarify  
7 what I meant by the term rates.

8 Rate equals -- represents the amount of  
9 herbicide -- or rate is the amount of herbicide that is  
10 applied, it's a rate of application or amount. It is  
11 the amount of herbicide that is applied.

12 And the rate is defined in the label  
13 through the registration process and I had referred to  
14 a range of rate that is on the label. And what that  
15 is, is a range in the amount of herbicide that can be  
16 applied as defined by the label, and I will give you an  
17 example.

18 In the case of glyphosate - which in  
19 forestry is used as the product Vision - Vision on the  
20 label, it says that you can apply a range of rate from  
21 3 litres per hectare to 6 litres per hectare. That is  
22 a range.

23 A forest manager, for example, might be  
24 using 4.5 litres per hectare to control aspen and he  
25 may be getting effective control and he might want to

1 know if he used a smaller amount of herbicide would he  
2 be able to achieve the same control. So he might try 4  
3 litres per hectare.

4 Now, if it was successful if he met his  
5 management objectives using the lower rate, he would  
6 likely start using a lower rate for the reasons I  
7 described yesterday.

8 On the other hand, if he tried 4 litres  
9 per hectare and he didn't achieve his management  
10 objective, it wasn't as efficacious, he wouldn't use it  
11 or if he had assessed it later on to see what -- how  
12 efficacious it was, he would likely have reported a  
13 negative or a nil response.

14 And that is, as I was referring to  
15 yesterday, some of the studies that look at rate and  
16 timing are testing limits and sometimes show nil or  
17 negative response because you have reached either your  
18 lower or your upper limit.

19 Q. Now, when we finished yesterday we  
20 were about to look at some information from your own  
21 studies and we did sort of get into some confusion.

22 And perhaps it would be wise to start at  
23 that stage by having you explain to the Board why you  
24 wanted to show them those particular slides from those  
25 studies.

1                   A. The studies that we handed out and  
2                   that we will be discussing very briefly are  
3                   representative of the type of studies that you would  
4                   normally see that would assess a cleaning treatment.  
5                   And we expect that it's quite possible that some time  
6                   during cross or perhaps later on in the hearings, you  
7                   will be looking at these types of studies and we  
8                   thought it would just be useful for you to see and  
9                   understand a little bit better the types of parameters  
10                  that are looked at in those studies and how they are  
11                  presented and what context they are looked at and the  
12                  general way they are presented and used.

13                  It's not really important for you to look  
14                  at the details of this particular study or the numbers  
15                  in this particular study, I just hoped to show you how  
16                  things are represented and basically what they -- how  
17                  we use them and the general trends that they show.

18                  Q. And I understand then, in those  
19                  particular studies, you are showing how some of the  
20                  parameters that you were talking about earlier are  
21                  displayed in those studies, and it probably would be  
22                  wise at this stage to look back at that list of  
23                  parameters.

24                  A. That's right. We are looking now at  
25                  the third overhead I had used yesterday titled:

1 Parameters Used to Evaluate Response. As you recall, I  
2 had talked about the five parameters that were looked  
3 at in the particular studies that I reported.

4 We looked at survival, which was the  
5 number of trees that survived following a treatment; we  
6 would look at pre-treatment stocking and following a  
7 cleaning treatment, how many trees had survived; we  
8 looked at height and in two ways -- you can look at  
9 height in two ways, either total height from ground to  
10 the top of the tree, or the annual growth; I talked  
11 about diameter; I talked about volume and, again, you  
12 can look at volume on a per stem basis or on a per  
13 hectare basis; and I talked about dominance, dominance  
14 being a relative comparison of the crop tree and how  
15 it's growing in relation to other vegetation around it,  
16 and I said that it was reported usually in three  
17 categories, either as suppressed with trees growing  
18 around it and over top of it; intermediately suppressed  
19 where there is trees around it but not completely  
20 suppressed, there is some openness; and open, where the  
21 tree is growing open free of competition.

22 I also had said that when looking at  
23 these parameters it's usually important to have a  
24 control to use as a comparison, and I think that would  
25 probably be a good idea right now to just clarify the

1 term control as we use it in these types of studies.

2 A control is just an untreated area that  
3 is used for comparison. It is similar and  
4 representative of the treated area, the only difference  
5 being that it was not treated. And from that we have a  
6 basis of comparison so we can look at the response on  
7 the treated area and then look at the control and see  
8 what would have happened had we not treated it.

9 Q. Now, when you looked at those 116  
10 studies, do they tend to look at only one of those  
11 parameters or will one study look at more than one?

12 A. It's common for studies to look at  
13 more than one of these parameters at the same time.  
14 And in the study that we will be looking at, the study  
15 that I did in Manitouwadge, we actually looked at three  
16 of these parameters.

17 We assessed height, we looked at annual  
18 height growth; we assessed volume, we looked at volume  
19 on a per stem basis, that was volume of individual  
20 trees; and we measured annual height -- annual volume  
21 growth; and we also looked at dominance.

22 Q. So I understand then that the three  
23 diagrams that you will be showing to the Board are  
24 examples of the way that data are displayed when one  
25 looks at the parameter of dominance, another one

1 looking at height, and another one looking at volume?

2 A. That is right. I think I will go to  
3 the slide. If you could turn to page 9--

4 Q. It's Exhibit 628.

5 A. --I will ask you to focus your  
6 attention to just the graph at the top of the page, the  
7 one that is titled: Snowflake Lake, black spruce.

8 If you look at the three bars on the left  
9 side of that graph, you will see underneath it says  
10 "control". The trees in this area, the trees that are  
11 represented by those three bars were trees that were  
12 measured that were growing in the untreated area. That  
13 was the untreated area that was used as a similar  
14 comparison.

15 The bar on the far left side which is  
16 solid white indicates that of 115 trees that were  
17 assessed in that area, 55 per cent were growing under  
18 suppressed conditions; in the cross-hatched bar it  
19 shows that about 30 per cent of the 115 trees were  
20 growing under intermediate suppression; and the clear  
21 bar indicates that about 10 per cent of the trees of  
22 the 115 trees were growing in open growing conditions.

23 Now, if you look at the three bars on the  
24 right side of that graph, those are the trees that we  
25 assessed in the treated area.

1                   Now, you can consider this is an  
2     untreated area on one side of the road and a treated  
3     area is on the other side of the road. They are  
4     similar areas. This treated area is the area that was  
5     cleaned. (indicating)

6                   Q. And for the purposes of the record,  
7     the slide that you are looking at shows the suppressed  
8     trees to be a white bar. I understand the actual  
9     report which is the exhibit, in the report that bar is  
10    dark black?

11                  A. Oh, thank you.

12                  THE CHAIRMAN: It's black and white, in  
13    other words.

14                  MS. KRISHKA: I'd like to think so. If  
15    you look again at the three bars on the right in the  
16    treated area, on your copy the dark black bar on the  
17    the first one on the left indicates that about 5 per  
18    cent of the 129 trees that were measured were growing  
19    under suppressed conditions; about 10 per cent of the  
20    trees in the cross-hatched area were growing --  
21    represented by the cross-hatched area were growing  
22    under intermediate suppression; and 85 per cent of the  
23    129 trees that were assessed in the treated area were  
24    growing open, free of competition.

25                  And what that indicates is that -- this

1 was three years -- this was assessed three years after  
2 the cleaning treatment. There is -- it indicates that  
3 there was a shift in the trees that were growing in  
4 suppressed conditions to trees growing in open growing  
5 conditions.

6 MR. MARTEL: Can I ask a question then:  
7 What did you start from? And I can't understand, if  
8 you have got these bars three years after, what was the  
9 starting point?

10 I mean that is the difficulty people -  
11 maybe I am alone - have in comprehending this. But  
12 what is the starting point? This is three years after,  
13 but what percentage of the trees prior to the  
14 treatment...

15 MS. KRISHKA: Well, the untreated area  
16 that is represented by the three bars on the left, that  
17 untreated area will give you an indication of how those  
18 trees would be growing if they had not been treated.

19 You can assume that the trees in the  
20 treated area were growing very similarly to the trees  
21 in the untreated area. So their condition, their  
22 dominance condition...

23 MR. MARTEL: Go ahead.

24 MS. KRISHKA: Trees are only tended if  
25 they are under suppression. So you can basically

1       assume that had the area been tended, the trees were  
2       suppressed. If you had these types of growing  
3       conditions -- if the majority of your trees were  
4       growing under open growing conditions, there would have  
5       been no need for a cleaning treatment.

6                     Does that help?

7                     MR. MARTEL: Fine.

8                     MS. MURPHY: Q. When you do these  
9       studies, are you interested in knowing what the  
10      situation would be if you hadn't treated?

11                    MS. KRISHKA: A. Yes, that is the  
12      purpose of the untreated area. The purpose of the  
13      untreated area is to give you a picture of the  
14      condition the trees would be growing in if you hadn't  
15      performed the treatment.

16                    THE CHAIRMAN: So to put it another way,  
17      the areas on the left are the benchmark from which you  
18      measure whether or not there is going to be a benefit  
19      from treatment?

20                    MS. KRISHKA: That's correct.

21                    THE CHAIRMAN: And that you can assume,  
22      for the purposes of this type of study, that when you  
23      are looking at the effect of treatment, the control  
24      area would represent what the treated area would be if  
25      they weren't treated?

1 MS. KRISHKA: Yes.

2 MS. MURPHY: Q. Now, in this particular  
3 part of the study you were accessing dominance. Why is  
4 it important to you to look at that particular  
5 parameter?

6 MS. KRISHKA: A. Well, when a tree is  
7 growing without suppression, generally it results in an  
8 increased growth rate, so it is often reflected through  
9 increases in height or diameter or volume growth.

10 Q. And does this information alone tell  
11 you whether you in fact got an increase in height or an  
12 increase in volume?

13 A. This alone does not, you have to look  
14 at further parameters to then see if that assumption is  
15 correct.

16 Q. And so I understand that the other  
17 two slides that come from this study show the  
18 assessment of those other two parameters?

19 A. That's correct.

20 Q. All right.

21 A. Before we leave this study, I would  
22 just like you to note that the other two plantations  
23 that are represented by the two other graphs just show  
24 the same general trends and it just verifies what we  
25 saw in the first study area.

1                   The next graph is on page 16 of the  
2     report. This graph represents the average annual  
3     height growth in the treated areas and the untreated  
4     areas. And I would like you to just focus your  
5     attention to the two bars on the far right. They  
6     represent the study area that we looked at in the  
7     previous slide.

8                   The bar graph, the solid black bar  
9     graph -- bar rather, represents the trees that were  
10    growing and measured in the treated area. The  
11    cross-hatched bar on the far right represents the trees  
12    that were measured in the untreated area.

13                  What we see here is it's pretty clear, we  
14    are getting a significant increase in annual height  
15    growth in the treated area as compared to a similar  
16    untreated area. We would assume from this that if the  
17    trees in the solid bar had not been treated they would  
18    be growing -- their height growth would be similar or  
19    the same as the height growth of those trees in the  
20    cross-hatched bar.

21                  The bars on the rest of the graph, the  
22    bars representing the other two plantation areas, also  
23    indicated the similar trend in the other two  
24    plantations.

25                  Q. So this shows you the part of the

1 study in which you assessed the height parameter?

2 A. That's correct. And the results we  
3 are seeing helps to verify what we saw in the previous  
4 slide when we looked at dominance.

5 If you turn to page 9 -- I'm sorry page  
6 13, this graph represents -- sorry, this graph  
7 represents the average annual volume growth in the same  
8 plantations. m.

9 Once again, please look at the two bars  
10 on the far right side, we are looking at the same  
11 plantation again. Once again, the bar -- the solid  
12 black bar represents the trees that were measured in  
13 the treated area and the cross-hatched bar represents  
14 the trees that were measured in the untreated area  
15 that was used as a comparison.

16 We see quite a dramatic increase in  
17 volume growth in the treated trees that were measured  
18 in the treated area as compared to the annual volume  
19 growth in the trees that were measured in the untreated  
20 area. Once again we would assume that the trees -- if  
21 the trees in the untreated area hadn't been cleaned,  
22 they would be growing at approximately the same rate as  
23 those trees in the untreated area.

24 It appears that the volume growth in the  
25 treated area is approximately -- it's close to 400 per

1 cent and, as I said yesterday, we wouldn't look at this  
2 and say: Well, at this point we are getting an annual  
3 volume growth increase of 400 per cent and expect that  
4 rate to continue and expect to get 400 per cent  
5 increase every year and at harvest have a huge volume  
6 gain. We would expect that volume growth to slow down  
7 over time and, therefore, we wouldn't extrapolate this  
8 directly to time of harvest.

9 THE CHAIRMAN: Is there any correlation  
10 between height increment and volume increment other --  
11 or is that determined by the particular specie  
12 involved?

13 MS. KRISHKA: Well, height is a factor of  
14 volume. Volume is basically determined by height and  
15 diameter growth, so height would certainly be a factor  
16 in volume.

17 THE CHAIRMAN: If you ascertained that  
18 the height increased by such and such a percentage,  
19 that wouldn't necessarily translate into a percentage  
20 increase in volume?

21 MS. KRISHKA: No, it wouldn't. No,  
22 because in fact diameter plays a more important role in  
23 the -- when you are calculating volume growth. How do  
24 I say this, diameter -- increases in diameter are more  
25 important in the resulting volume increase than height

1 alone.

2 THE CHAIRMAN: Yes.

3 MS. KRISHKA: So you couldn't directly  
4 say: If you have this much gain in height, you would  
5 then assume this much gain in volume.

6 THE CHAIRMAN: That wasn't my question  
7 really. And that doesn't -- you can't even do that  
8 when you are looking at particular species. You can't  
9 say: If there is such and such a height increase in  
10 jack pine, that will translate into such and such a  
11 volume increase?

12 MS. KRISHKA: No, you can't do that for  
13 any species.

14 MRS. KOVEN: Obviously you can't  
15 extrapolate this rate of volume growth over the entire  
16 rotation age to harvest, but surely if you get more  
17 volume earlier on in the life of the tree, then you are  
18 pushing up the rotation age significantly?

19 MS. KRISHKA: Certainly. It would -- in  
20 some cases, it would depend on the product you wanted.  
21 You could either harvest earlier, decrease your  
22 rotation age, or you could increase your rotation age  
23 and attain a greater yield.

24 I had intended at one point to show you  
25 an example of some data that was collected on another

1 study area, and I don't think we will bother doing that  
2 because it just basically shows the same trends that we  
3 saw in this particular study.

4 MS. MURPHY: Unless there are any further  
5 questions on that part, I think at this stage it would  
6 be helpful to look at Ms. Krishka's slides and I think  
7 in those she is going to be able to show you some of  
8 the things that they might measure in these studies.

9 Ms. Krishka has provided a list of the  
10 slides and we have marked that as Exhibit 625.

11 MS. KRISHKA: This first slide shows a  
12 suppressed 10-year-old black spruce. Now, I realize it  
13 is pretty hard to see it, but that's it right about in  
14 the centre of the photograph, where that red dot is, is  
15 the leader of the black spruce. (indicating)

16 This spruce is growing under severe brush  
17 competition. This -- if we had been classifying the  
18 dominance condition here, we would have called this  
19 suppressed. The reason why this individual has  
20 probably survived where most of them probably haven't,  
21 is that it is growing in a little bit of an open area.  
22 There is a bit of a break in the crown there, so it has  
23 received enough light and space to survive, but  
24 obviously the growth rate is extremely slow.

25 MS. MURPHY: Q. And that was No. 1 in

1 the witness statement?

2 MS. KRISHKA: A. That's right. This  
3 next slide was slide No. 2 in the witness statement.  
4 This is another 10-year-old black spruce. These photos  
5 were taken here in Thunder Bay District just up the  
6 Spruce River Road.

7 This black spruce is growing under what  
8 we would have called intermediate suppression. It  
9 survived because it was growing, again in a little bit  
10 of an open area, and it has managed to plod along  
11 enough that it is now approaching free to grow status.  
12 So probably by the next year it would have been able to  
13 start increasing its annual height growth and volume  
14 growth because --

15 THE CHAIRMAN: Sorry. How would you  
16 classify it as free to grow when it is not free of  
17 competition?

18 MS. KRISHKA: I would say at this point  
19 it was approaching free to grow. It is not free to  
20 grow now, but now that it seems to be competing about  
21 evenly with the surrounding competition, it would be  
22 approaching the point and then maybe another year or  
23 two where it may be able to be classified as free to  
24 grow.

25 THE CHAIRMAN: I guess I am having some

1 trouble in understanding what you mean by free of  
2 competition. Even though it is growing and surviving  
3 and getting to such and such a height, that picture  
4 would, to me, not be free of competition.

5 MS. KRISHKA: Well, it may be a little  
6 bit misleading. The trees behind it, the aspen, you  
7 can see the upper canopy is fairly open right there  
8 (indicating) and it is not quite as close as it might  
9 appear in that picture. You can have competition  
10 nearby, but as long as it is not encroaching upon that  
11 particular individual, then it is not competing with  
12 it.

13 THE CHAIRMAN: I see. So notwithstanding  
14 at the base of any particular tree you might have all  
15 kinds of vegetation or undergrowth or whatever you want  
16 to call it, as long as the tree -- sorry, the tree  
17 makes it's way through all of this and starts growing  
18 above everything else around it, it is free of  
19 competition.

20 MS. KRISHKA: Exactly.

21 THE CHAIRMAN: Is that what you mean?

22 MS. KRISHKA: Exactly.

23 THE CHAIRMAN: Thank you.

24 MS. KRISHKA: The next photo is photo No.  
25 3 in the statement of evidence. This is a black spruce

1 tree that's growing under dense grass competition.

2 Yesterday Dr. Campbell referred to spruce growing under  
3 grass competition and he said that what happens is that  
4 at the end of the season when the grass dies it  
5 flattens the tree down during the winter.

6 Well, this is a classic example of that.  
7 I realize it is kind of hard to see, but that's because  
8 this tree has been suppressed so much it is fairly  
9 chlorotic and resembles the look of dead grass, but  
10 what happens is, when the grass grows and flattens the  
11 tree every year, the next season the tree might start  
12 to grow back up again, at the end of the season it is  
13 flattened again.

14 And what you end up getting is sort of a  
15 step formation of the tree, it grows up and then kind  
16 of horizontal and up again, and kind of horizontal  
17 again until it dies.

18 This next slide was not included in the  
19 statement of evidence. This is a planter planting  
20 black spruce paper pots here in Thunder Bay District.  
21 You can see that there is a fair bit of vegetation on  
22 the site even at time of planting, and I just wanted  
23 you to see that this is not really an uncommon  
24 situation where the trees are put into basically a  
25 competitive situation even right from the beginning.

1                   This might have been a situation where  
2                   the forest manager might have considered using chemical  
3                   site preparation to control the vegetation prior to  
4                   planting.

5                   This next slide is also not in the  
6                   statement of evidence. This is a black spruce paper  
7                   pot that was planted in 1981. This photo was taken  
8                   four years -- four growing seasons after being planted  
9                   and it is growing under a fair bit of grass and  
10                  herbaceous competition. The tree has put on very  
11                  little annual height growth and you can see it is  
12                  slightly chlorotic, it is suffering from the  
13                  competition. This particular individual may have been  
14                  classified as either suppressed or intermediately  
15                  suppressed.

16                  This is another example of a black  
17                  spruce. Again, this photo was not included in the  
18                  statement of evidence. This is also four years after  
19                  planting and it is growing under fairly heavy grass  
20                  competition. You can see that the spruce tree isn't  
21                  even as tall as these blades of grass here and the  
22                  annual growth is fairly small. It is surviving, it is  
23                  receiving enough light to survive, but the growth rate  
24                  is extremely slow.

25                  MS. MURPHY: Q. You have noted that the

1 annual growth is very small. How can you tell that  
2 from looking at that picture?

3 MS. KRISHKA: A. The leader, which  
4 represents the annual growth. This is what we would  
5 call the leader and this is the whirl or the -- okay,  
6 these are the side branches. This would represent the  
7 end of the previous year's growth and from here to the  
8 top of the tree would indicate that year's growth, and  
9 we would normally refer to that as the leader.

10 THE CHAIRMAN: So is that how you can  
11 tell the age of a tree, by looking at the side branches  
12 coming out and counting the number as you go up the  
13 stem?

14 MS. KRISHKA: Well, there actually may be  
15 side branches within the annual growth, but you can see  
16 where the annual - this isn't working - you can see  
17 where the annual growth ends because there is sort of a  
18 clump of side branches or lateral branches and it  
19 indicates to you that's where the previous year's  
20 growth ended and where the next year's growth started.  
21 Yes, that's how you could count.

22 I will go on. This is photo No. 6. This  
23 was not included in the statement of evidence -- oh,  
24 I'm sorry, photo No. 7. It was not included in the  
25 statement of evidence either.

1                   This is a plantation that was planted in  
2                   a sort of a corridor. The site prepared leaving wind  
3                   rows and you can see the wind rows on either side of  
4                   that opening area. This area has been planted with  
5                   white spruce bareroot stock. It was fairly large  
6                   stock, and four years later you can barely see it and  
7                   that's because competition has come back quite  
8                   prolifically in this area and that's partly a result of  
9                   the disturbance of the site preparation, disturbing the  
10                  soil, opening the area and small lesser vegetation,  
11                  herbaceous vegetation coming up and growing in that  
12                  open area.

13                 MRS. KOVEN: Is site preparation  
14                 always -- does it always work against the seedling in  
15                 terms of, does it always promote competition?

16                 MS. KRISHKA: No. Site preparation is  
17                 often used as a tool to try and help control  
18                 competition, but on a highly productive site it is  
19                 pretty difficult to do that.

20                 Sometimes if you were to use site  
21                 preparation in order to control competition, you would  
22                 have to disturb the site so much that it really  
23                 wouldn't be desirable. So the answer is; sometimes it  
24                 does help control them and other times it doesn't.

25                 MRS. KOVEN: If you site -- if you put

1 most of your effort into site preparation, would that  
2 lead to less work having to be done in tending, in  
3 cleaning?

4 MS. KRISHKA: If you used mechanical site  
5 preparation?

6 MRS. KOVEN: Yes, or chemical.

7 MS. KRISHKA: If we were able to control  
8 competition prior to planting it could lead to a  
9 reduction in the need for tending, but it would not  
10 likely eliminate it. It would really depend on the  
11 site and how productive the site was.

12 Next one.

13 The next photo is photo No. 8. This also  
14 was not included in the statement of evidence. This  
15 area was planted with white spruce, bareroot, large  
16 stock. This picture was taken four years after  
17 planting and you can see it has very severe herbaceous  
18 suppression. You can barely see any of the spruce in  
19 here and the type of white spruce that was planted here  
20 is about the largest kind we usually plant.

21 This is fireweed and there is some  
22 goldenrod in this area as well. It has come up very  
23 dense. It doesn't grow much bigger than that, that's  
24 as tall as it gets, and that's probably about a foot to  
25 a foot and a half high.

1                   Once the crop trees are able to grow  
2   above that kind of competition they would start to grow  
3   and shade, and this type of vegetation would be  
4   reduced, but in the meantime it is pretty hard for them  
5   to get through. This would probably be a fairly  
6   productive site. This would be severe suppression.

7                   This next photo is photo No. 9. Again,  
8   this was not included in the statement of evidence, is  
9   a 10-year-old white spruce plantation and the forester  
10   in the photo, his left hand is holding the top of the  
11   white spruce so it is about at his waist.

12                  This area was planted in 1971. This  
13   photo was taken 10 years later. This is, again, in  
14   Thunder Bay District nearby. This is a mixed wood  
15   stand, it is primarily -- the biggest component of the  
16   this stand is obviously aspen. There is spruce planted  
17   and it is basically growing up underneath and is making  
18   up a smaller component of this stand. Over time you  
19   will have a mixed stand.

20                  If you were to tend this stand by  
21   cleaning, what you would likely do is shift the  
22   component, have more spruce in this stand. You would  
23   still have the aspen in the stand, simply because of  
24   the number of stems that are in there.

25                  This next photo is -- this is photo No.

1 10 and it was 14 in the statement of evidence. This is  
2 a white spruce tree that was growing under severe aspen  
3 competition. This photo was taken nine years after  
4 planting, and I would just like you to note that this  
5 area wasn't tended. The reason why there is no leaves  
6 out is this was early in spring in May and it was prior  
7 to leafout.

8 So if I had taken this photo a month  
9 later you would have had a hard time seeing that  
10 particular tree because of the dense aspen and birch  
11 growing all around it. Keep this photo in mind.

12 This next photo is the same area. This  
13 is photo No. 11, it was photo 15 in the statement of  
14 evidence. This is the same plantation as you saw in  
15 the previous stand. That plantation had been  
16 prescribed for manual cleaning. They had cleaned the  
17 site with brush saws with a herbicide applicator  
18 applying glyphosate, and although that's not terribly  
19 clear, you can see that it was a fairly effective  
20 method.

21 They went in with the brush saws. It was  
22 early enough in the season that they could clearly see  
23 the stems of the competition and they could clearly see  
24 the crop trees, so they were able to cut those stems  
25 without damaging any of the crop trees.

1 THE CHAIRMAN: Ms. Krishka, when you come  
2 in with a brush saw, is there any attempt to remove any  
3 of the debris that you have cut or do you just leave  
4 it?

5 MS. KRISHKA: It is usually just left.

6 THE CHAIRMAN: And lying on the ground  
7 doesn't retard anything in terms of providing  
8 competition for what's trying to grow?

9 MS. KRISHKA: Well, particularly not in  
10 this case when you are cutting just long stems of trees  
11 it really doesn't provide -- cause any conflict of  
12 competition, no.

13 This is photo No. 12, it was 13 in the  
14 statement of evidence. This was a white spruce  
15 plantation that had been tended using Velpar spot  
16 application.

17 You recall in Dr. Campbell's evidence he  
18 showed you a picture of a spot gun. It is a direct  
19 application of herbicide at the base of the tree and  
20 around it and, in this particular case, there was grass  
21 and herbaceous competition that was suppressing the  
22 black spruce. They are able to go through and clear  
23 and control the competition directly around the trees,  
24 but if you look in the background you can see that the  
25 brush in the surrounding area wasn't affected.

1                   This next photo, photo No. 13, it was  
2 photo No. 17 in the statement of evidence. This is a  
3 control area. This is an area in Kirkland Lake. It  
4 had been planted in the spring of 1982 and this photo  
5 was taken five growing seasons after planting.

6                   You can see - no, you can't - it's very  
7 difficult to see, but there is a crop tree growing  
8 right here (indicating) and there is another crop  
9 tree - can you hear me? - there is another crop tree  
10 growing right here just on the edge of this area where  
11 there is a lot of aspen competition. (indicating)

12                   THE CHAIRMAN: Gallantry is not always  
13 rewarded.

14                   MS. CRONK: Immediately.

15                   MS. KRISHKA: The point I am trying to  
16 make here is that this is an area that was not tended,  
17 there is severe competition. If you look in the  
18 background of that photo it's right -- that's right at  
19 the edge of the area that had not been tended.

20                   This next photo is just a few -- is about  
21 a hundred feet away from where this particular photo  
22 was taken. Here you see the jack pine and the spruce  
23 is growing extremely well. That particular individual  
24 is over six feet tall and he is standing up.

25                   This is photo 14 and it was photo 18 in

1 the statement of evidence. This, again, is five  
2 growing seasons after planting. It had been site  
3 prepared using hexazinone or Velpar in 1981 and planted  
4 the following year. You wouldn't normally expect to  
5 see this kind of growth rate in five years, but this  
6 was a particularly productive site and you could see  
7 from the previous slide that it was a very productive  
8 site for the non-crop species as well.

9 The next photo, photo 15, was photo 11 in  
10 the statement of evidence. These are -- the next two  
11 pictures or next several pictures were taken in the  
12 area in Manitouwadge where -- in the study area of the  
13 graphs that we had looked at a few minutes ago.

14 This is a black spruce that is  
15 suppressed. It would have been classified, dominance  
16 is suppressed seven years after planting. This is in  
17 that control or the untreated area that I had  
18 described. The reason why you don't see foliage all  
19 around it is because this photo was taken in October  
20 after leaf fall and you can see a little bit of the  
21 discoloration is still there in the trees in the  
22 background. If we had taken this picture in the summer  
23 you would have had a pretty hard time seeing that tree.

24 This next photo in the adjacent treated  
25 area. This is a photo of black spruce. Again, this is

1 seven years after planting, three years after release  
2 treatment using 2,4-D. This individual would have been  
3 considered growing open -- under open growing  
4 conditions and, again, if you look at that long leader  
5 at the top, as I had indicated before, that is an  
6 indication of the annual height growth and it is  
7 growing extremely well this time.

8 In this case you would have been able to  
9 look at height growth and just by observation see a  
10 very obvious and clear increase in growth in the  
11 treated area.

12 This next photo, this is photo 17, it was  
13 9 in the statement of evidence and is kind of my answer  
14 to Peter Hynard's biscuit. This is a stem profile of  
15 two individual trees. There was -- the tree that's  
16 represented on the left side was selected from the  
17 treated area and the tree on the right side that says  
18 "control" was a tree that was selected from the  
19 untreated area.

20 What happened was that these two  
21 individuals were selected and they were cut at various  
22 points along the length of the stem and then we looked  
23 at the diameter growth. If you look at the bottom of  
24 the photo, the two cross-sections, these cross-sections  
25 were done at zero metres above ground level, so right

1 at the base of the tree. And you can see that the  
2 diameter is greater and the ring width is also greater.  
3 It is not quite as clear on that particular individual.

4 If you go up to the middle row you will  
5 see that this section was taken at .4 metres up the  
6 stem of the tree. Again, the tree in the -- that had  
7 been treated is wider and you can see the growth rings  
8 fairly clearly there. They are growing quite a bit  
9 wider than the growth rings on the tree that was  
10 selected from the untreated area.

11 If you look at the top row, this section  
12 was taken at .7 metres up the base of the tree. Again,  
13 the individual has a wider diameter and the growth  
14 rings are very clear and obviously wider. What the  
15 growth rings represent is the annual diameter growth  
16 that's put on.

17 This next photo is photo 18, it was No. 8  
18 in the statement of evidence. This is a spruce  
19 plantation that was released from aspen and brush  
20 competition. It had been planted in 1981 and it was  
21 released with glyphosate in 1985.

22 This photo was taken the following spring  
23 after it had been released, and you can see that the  
24 aspen is controlled, you can also see that there is  
25 vegetation down -- non-crop vegetation on the ground

1 around those crop trees.

2 It was not controlled by the herbicide  
3 application. That would likely have been because the  
4 tall competition, the upper canopy, would have  
5 intercepted the herbicide and would have, in essence,  
6 protected the lower vegetation on the ground. That  
7 vegetation is not posing any type of competition for  
8 the crop trees and, therefore, there is no real concern  
9 about not achieving control of those particular  
10 individuals.

11 This is photo 19, it was 16 in the  
12 statement of evidence. In this photo the left side of  
13 the photo represents the area that was not treated; the  
14 right side was treated. It was cleaned using the  
15 herbicide glyphosate.

16 This photo was taken right along the edge  
17 of the application, so you can see one side being  
18 treated and the other side not being treated. You can  
19 see you get fairly good control of the competing brush,  
20 the large brush competition. This photo was taken two  
21 years - four years after - yes, this photo was taken  
22 four years after the herbicide treatment and you can  
23 see that in the treated area herbaceous vegetation is  
24 coming back, is back on the site, occupying the site.  
25 There is spruce in that particular plantation that you

1 can't see clearly in that photo, but it is doing fairly  
2 well.

3 This is photo 20, it was not included in  
4 the statement of evidence. This is a 15-year-old black  
5 spruce plantation here in Thunder Bay. This was  
6 treated with 2,4-D in 1981 and this photo was taken  
7 five years later. This photo was taken in September,  
8 so the discolouration you are seeing there is a result  
9 of fall colouration, not because of any herbicide  
10 application.

11 You can see that the aspen is still in  
12 the stand, it is still a component of this stand, but  
13 you can also see that the crop trees are growing quite  
14 well. This would be considered a mixed stand. The  
15 management objective in this particular stand was to  
16 have a certain amount of aspen component.

17 Although you have both aspen and spruce  
18 growing fairly close together, the spruce is not being  
19 competed with by the aspen, there is a mixed component,  
20 it meets the timber management objective. And I would  
21 venture to say that in most likelihood this kind of  
22 condition would also be acceptable to wildlife  
23 managers.

24 The next two photos are pictures of the  
25 area that the Board visited in your recent site visit.

1 It is the white spruce plantation near the Bonner Tree  
2 Improvement area. These two photos were taken in 1983.

3 This is the control area on the one side  
4 of the road that had not been tended, it was a white  
5 spruce plantation that was planted in 1951. Hold in  
6 mind that this is the same plantation that wasn't  
7 tended.

8 This next photo is the same plantation  
9 across the street that had been tended. This is photo  
10 22, it was 46 in the statement of evidence. This  
11 picture is taken 32 years after being planted. It had  
12 been manually cleaned at least four times on an as need  
13 basis. At 27 years -- or 28 years after being planted,  
14 as you recall in that table I handed out yesterday,  
15 there is a 400 -- over 400 per cent increase in volume  
16 per hectare in the treated area as compared to the  
17 untreated area.

18 MS. MURPHY: Q. Just to clarify, that is  
19 the same study area that was reported on the table  
20 attached to Exhibit 627 and the last item noted on that  
21 table; is that correct?

22 MS. KRISHKA: A. That's correct. This  
23 last photo is photo 23. It was not in the statement of  
24 evidence. And this is just an example of some of the  
25 development work that is being done in the vegetation

1 management area.

2 This person is an assessor who is working  
3 on a project to develop a competition index that will  
4 help -- be helpful in assessing vegetation competition  
5 on a site. That's an on-going project that's being  
6 done in cooperation with the technology development  
7 unit.

8 We hope that this will be useful in the  
9 future in doing assessment of cleaning projects.  
10 That's the end of my slide presentation.

11 MS. MURPHY: Mr. Chairman, I think we can  
12 actually complete Ms. Krishka's evidence-in-chief in  
13 about 15 to 20 minutes if you would like to continue.

14 THE CHAIRMAN: Yes, let's continue and  
15 finish off with Ms. Krishka and then we will have the  
16 morning break.

17 MS. MURPHY: Fine.

18 MS. KRISHKA: As I had mentioned  
19 yesterday, I had said there were two different ways  
20 that you could assess whether a treatment had been  
21 effective or not. I said you could examine scientific  
22 studies or you could look at experience that's been  
23 gained in the field through observation and through  
24 monitoring.

25 MS. MURPHY: Hold on one minute. If we

1 just turn that off I'll hear better.

2 Thank you.

3 MS. KRISHKA: Field observation is  
4 probably the most common way we use to assess cleaning  
5 treatments and it's also probably the most useful. And  
6 Mr. Galloway had discussed yesterday how foresters talk  
7 to each other and transfer information between each  
8 other and go and look at each other's sites and  
9 compare.

10 Effectiveness of treatment can be  
11 assessed in several ways and this could be considered  
12 effectiveness monitoring. We use free to grow surveys  
13 that help to tell us -- assess cleaning treatments. We  
14 use visual observation and we also rely on field  
15 studies. Field studies are important, I don't mean to  
16 minimize their importance, and they are on-going.

17 Those types of field studies are being  
18 done by the MNR and also by other agencies and, in  
19 relation to field studies, I would just like to  
20 summarize the important things to remember to consider  
21 in field studies.

22 Studies have to be conducted with care,  
23 you must have a comparable, an acceptable untreated  
24 area so you can compare, you need a sound methodology  
25 and, very important, you must keep proper records and

1 have a good reporting procedure so that if you do want  
2 to go back and look at an area years later, you have  
3 some background information.

4 MS. MURPHY: Q. But you also mentioned  
5 the normal situation being visual observations and  
6 conducting free to grow surveys. And are the visual  
7 observations conducted in situations similar to those  
8 situations we saw in the photographs that you showed us  
9 earlier?

10 MS. KRISHKA: A. Yes, yes they are. You  
11 can learn a lot just by getting dirty walking around in  
12 a field and looking at what results are like.

13 And the main message here I think to  
14 leave you with with regards to effectiveness of  
15 cleaning is that cleaning treatments, when they are  
16 prescribed properly and applied properly, for timber  
17 management purposes result in beneficial results.

18 Q. Now, you explained earlier that you  
19 had a second part to your evidence and you described  
20 what that was. And I understand that you are going to  
21 be able to deal with that in fairly short order. Would  
22 you like to explain what it is and...

23 A. Yes. Could I have the overhead,  
24 please?

25 Part B, or the second part rather of my

1 evidence deals with the effects of tending by all  
2 tending treatments on the forest estate. And I am  
3 going to be relying a fair bit on evidence you have  
4 heard previously by Ken Armson and by Richard  
5 Greenwood.

6 On this overhead you will see a list of  
7 the effects of tending on the forest estate and some of  
8 those processes listed under the various types of  
9 tending treatments. And I know the list is long, but I  
10 really don't intend to spend much time discussing it.  
11 I think most of it has been very well covered up 'til  
12 now.

13 I will start with tending treatments.  
14 Commercial thinning, improvement cutting, salvage  
15 cutting and other intermediate cuts and their effect on  
16 the seven processes that are listed there: Soil  
17 fertility, water yield, surface runoff, soil  
18 compaction, soil surface erosion, micro-climate and  
19 forest diversity. These processes have all been  
20 described to you in general terms by Ken Armson in  
21 Panel 9 and the effect on these processes by harvest  
22 were described in detail by Richard Greenwood in Panel  
23 10.

24 Tending treatments and the effect of the  
25 tending treatments on these processes is similar to

1 harvest, but to a much lesser degree. The remaining  
2 vegetation and the remaining crop trees that are left  
3 on the site following these tending treatments mitigate  
4 the effect of these tending treatments on these  
5 particular processes.

6 Moving on to pruning and pre-commercial  
7 thinning. Basically these types of treatments have a  
8 beneficial effect on the forest estate. As a result of  
9 these practices you improve timber productivity by  
10 making more resources available to the residual stand.

11 Pruning and thinning also act to improve  
12 wood volume and wood value and Peter Hynard described  
13 that to you on Monday, how pruning can help to improve  
14 wood value.

15 Cleaning and the effect of cleaning on  
16 forest soils and vegetation through water yield,  
17 surface runoff and erosion, micro-climate and forest  
18 diversity were also discussed by Ken Armson in Panel 9  
19 and discussed by Richard Greenwood when he talked about  
20 the specific impact of these processes by harvest and  
21 site preparation in Panels 10 and 11.

22 I will not discuss these processes in any  
23 detail at all, there is just a few points that I would  
24 like to make.

25 When Mr. Greenwood talked about these

1 processes, I believe in Panel 10, he said that the  
2 magnitude of the changes in water yield are  
3 proportional to the degree of canopy removal. In view  
4 of that statement, cleaning will have a minimal effect  
5 on water yield simply because you are removing --  
6 you're removing a small proportion of the canopy.

7 Removal of that proportion -- of that  
8 part of the canopy improves moisture available to the  
9 crop trees and would, as a result, assist to improve  
10 growth. So in fact that would have a beneficial  
11 effect.

12 Secondly, cleaning results in minimal to  
13 non-existent disturbance to the forest floor and  
14 removal of vegetation would be partial and temporary,  
15 therefore, cleaning treatments do not result in surface  
16 runoff and erosion.

17 And, finally, any change in surface  
18 temperature due to cleaning treatments will be short  
19 term and minimal and, as described by Ken Armson in  
20 Panel 9, any change in surface temperature would likely  
21 be an increase in surface temperature and that is  
22 considered a positive effect since it generally results  
23 in increased decomposition and increased nutrient  
24 availability.

25 Therefore, potential negative effects

1 from cleaning are generally mitigated by four things:  
2 One, the remaining non-crop vegetation that is not  
3 affected; two, the remaining crop trees that are on the  
4 site; three, regrowth of vegetation on the site; and,  
5 four, surface organic matter that is on the site.

6 So those four things were remaining:  
7 Non-crop vegetation, remaining crop trees, regrowth of  
8 vegetation, and surface organic material.

9 And the final thing -- the final aspect I  
10 will discuss is the effect of cleaning on forest  
11 productivity. This was discussed in the ESSA Document  
12 that was prepared on pesticides. That was Exhibit  
13 603C?

14 MS. MURPHY: Q. That's correct.

15 MS. KRISHKA: A. This paper was prepared  
16 by Carmean, Kurz and Krisha - myself - and this paper  
17 dealt with the impacts specifically of herbicides on  
18 forest productivity. But we, the authors, had agreed  
19 when we prepared the paper that the concepts that  
20 applied to cleaning using herbicide were similar for  
21 other cleaning techniques.

22 Q. And I believe there is a comment to  
23 that nature in the paper?

24 A. Yes, there is. I would like to  
25 conclude with just a quote from the general conclusions

1 of that particular paper. It reads:

2 "In general, a single application of a  
3 herbicide at registered concentrations  
4 and application rates is very unlikely to  
5 cause nutrient losses that would lead to  
6 a decline in forest productivity."

7 Q. I understand then that this overhead  
8 basically gives an overview of the material that is  
9 presented in your written material?

10 A. Yes, that's correct.

11 Q. And given that much of the  
12 information is very similar to information that has  
13 been heard previously by the Board, that is the extent  
14 of your evidence-in-chief on this matter?

15 A. Yes, it is.

16 MS. MURPHY: And that is the end of Ms.  
17 Krishka's evidence, unless you have questions, Mr.  
18 Chairman.

19 THE CHAIRMAN: Questions? Thank you very  
20 much. Thank you, Ms. Krisha.

21 The Board will break for 20 minutes at  
22 this time.

23 ---Recess taken at 10:20 a.m.

24 ---On resuming at 10:55 a.m.

25 THE CHAIRMAN: Thank you. Be seated,

1 please.

2 MS. MURPHY: The next witness is Mr.  
3 Michael Buss and, again before he begins, I would like  
4 to file two exhibits and I would like to advise as well  
5 that Mr. Buss will be referring to one previous  
6 exhibit. You will not need it, but I thought I would  
7 advise so that you can take a note.

8 This is an exhibit that is page 540 from  
9 the panel statement for Panel 10 and that is Exhibit  
10 416B at page 540. Mr. Buss will be referring to it  
11 but, as I say, you won't need a copy of it with you.

12 I would like to file then, in addition, a  
13 document called: A Generalized Illustration of Plant  
14 Communities Succession Including Tolerant Hardwood  
15 Climax Stage. And I believe we are at Exhibit 630, Mr.  
16 Chairman?

17 THE CHAIRMAN: That's correct.

18 MS. MURPHY: (handed)

19 THE CHAIRMAN: Thank you.

20 ---EXHIBIT NO. 630: Document entitled: A Generalized  
21 Illustration of Plant Communities  
22 Succession, Including Tolerant  
Hardwood Climax Stage.

23 MS. MURPHY: And one more document, this  
24 is an interrogatory to Panel 12 from Nishnawbe-Aski  
25 Nation, their Interrogatory No. 4.

1 THE CHAIRMAN: That will be Exhibit 631.

2 MS. MURPHY: (handed)

3 ---EXHIBIT NO. 631: NAN Interrogatory Question No. 4  
4 to Panel 12.

5 MS. MURPHY: Q. And, Mr. Buss, I  
6 understand that you will be speaking to Document No.  
7 5 - there you are - you will be speaking to Document  
8 No. 5 from the panel statement for Panel 12?

9 MR. BUSS: A. That's correct.

10 Q. The name of that document is:  
11 Potential Effects of Mechanical and Manual Tending on  
12 the Aquatic, Terrestrial and Socio-Economic  
13 Environments: Prevention, Mitigation and Enhancement.

14 In previous panels, Mr. Buss, these  
15 topics have been dealt with by three separate witnesses  
16 and, in this panel, we have decided to deal with these  
17 topics broadly through one witness; is that right?

18 A. That's correct.

19 MR. MARTEL: What page is that, please?

20 MS. MURPHY: I'm sorry that begins at  
21 page 357 in Volume II of this panel's statement.

22 Q. I also understand, Mr. Buss, that  
23 since your curriculum vitae was written you have  
24 undertaken some new duties with the Ministry of Natural  
25 Resources and that you would like to comment about

1 that?

2 MR. BUSS: A. Yes. Recently I secured a  
3 position in the Algonquin Region as Regional Ecologist.  
4 It's a new position and basically the position will be  
5 dealing with the incorporation of non-timber values and  
6 the various activities, management activities of the  
7 Ministry, both timber management and other land  
8 management activities.

9 Q. And in dealing with those duties,  
10 will you have any special duties with the respect to  
11 the timber management planning process?

12 A. Yes. I will be trying, as best as  
13 possible, to integrate fish and wildlife concerns in  
14 the timber management process; that is, liaising with  
15 the districts in the region to accomplish those tasks.  
16 I haven't been there yet, so I am not sure exactly what  
17 the job is.

18 Q. Now, would you plain explain to the  
19 Board then how you are approaching your evidence today,  
20 and I understand that we will probably be able to  
21 complete your evidence in a fairly short period of  
22 time.

23 A. Yes, I hope so. My evidence, as  
24 indicated by Ms. Murphy, will be dealing with three  
25 areas, the three areas being aquatic environment,

1 potential effects of mechanical/manual tending, and the  
2 terrestrial environment and on the socio-economic  
3 environment.

4 I will try and deal with the effects that  
5 are different from tending for manual/mechanical  
6 tending as have been described from harvest and renewal  
7 which you already heard about.

8 I should point out that particularly for  
9 the aquatic environment there is very little reported  
10 literature and Ms. Krishka in her closing comments or  
11 the last section of her evidence basically dealt with  
12 some of those reasons and I will just reiterate them  
13 for the Board.

14 Dr. Allin and Mr. Ward in Panels 9 and  
15 10, and Mr. Greenwood and Mr. Armson in previous  
16 panels, talked about the effects to the aquatic  
17 environment being related to the amount of timber  
18 removed on any particular site; that is, how much is  
19 removed in a particular catchment or near water bodies.

20 The amount of organic debris, both large  
21 and small, that might enter the water bodies as a  
22 result of activities, harvest or renewal activities,  
23 sediments that might be added from runoff or disturbed  
24 soil, and alterations to the nutrient regimes and  
25 nutrient cycles in the soil. And harvest obviously has

1 the most subtle and pervasive effects, both real and  
2 potential, in this regard.

3 By the time tending takes place, the  
4 sites will be revegetated, if the system does is an  
5 uneven-aged -- or an even-aged management system, the  
6 vegetation will already been in place, both crop and  
7 non-crop vegetation.

8 And in terms of the situation under an  
9 uneven-aged management, the site in the harvest is not  
10 totally removed in the first place so there is always  
11 vegetation present.

12 In addition, values that were identified  
13 prior to harvest and renewal and would be treated  
14 through areas of concern and the application of the  
15 guidelines and resource manuals, those conditions would  
16 still be in place at the time renewal takes place.

17 One of the activities of tending involves  
18 thinning and this probably has the greatest potential  
19 to remove material from the site, particularly if we  
20 are dealing with commercial thinning and it can be  
21 compared to selection harvesting and its effects.

22 With regards to water quantity, tending  
23 has been shown to have only transient influence on  
24 quantity because, as Ms. Krishna has just explained, the  
25 purpose of tending is to get the water uptake and make

1 water available to the crop trees and so their response  
2 in canopy and root growth, root expansion, would  
3 quickly nullify any increases in water yield that might  
4 come from a site being tended or thinned.

5 In the boreal forest, in addition, few  
6 conifers are removed in the tending process because  
7 they are the crop species being tended for and that  
8 also has -- ameliorates the effect because conifers  
9 take up water at a greater rate than the deciduous  
10 vegetation.

11 In terms of water quality, thinning is  
12 again used as an example because it has the greatest  
13 potential to remove material and there have only been  
14 minor changes to nutrient regimes indicated in the  
15 literature in streams, particularly in a study by  
16 Hornbeck, et al, 1987 in Connecticut where they were  
17 only able to detect or measure these changes during a  
18 one year period after the thinning operation and they  
19 weren't judged and we don't think they are of  
20 sufficient magnitude to affect water quality or aquatic  
21 growth.

22 Temperature isn't expected to be affected  
23 either because of the reduced amount of vegetation  
24 removed and remember that we already have areas of  
25 concern and modified harvesting around water bodies.

1                   Erosion is not anticipated to be a  
2                   problem either because with mechanical and manual  
3                   tending, heavy machinery is not taken on to the site  
4                   and so the kind of erosion we might anticipate from  
5                   rutting or compaction doesn't occur.

6                   You should realize too - and I think Mr.  
7                   Hynard referenced this - that to a large degree the  
8                   process of tending or thinning, the results of those  
9                   activities is taking place in the environment  
10                  naturally; trees and vegetation is naturally being  
11                  reproduced, they are thinning themselves, there is  
12                  vigorous competition on the site. So in a way the  
13                  process is an example of a natural process. We are  
14                  going to be talking about the differences in a moment.

15                  MS. MURPHY: And just before you carry  
16                  on, for the purposes of the record, the Hornbeck Study  
17                  that Mr. Buss just referred to is included in the  
18                  materials. I will just give you the reference.

19                  It's in Exhibit 603B and it starts at  
20                  page 384, Mr. Chairman.

21                  THE CHAIRMAN: Thank you.

22                  MR. BUSS: So in terms of preventing or  
23                  mitigating effects to the aquatic environment, we rely  
24                  on the adherence and the application of the Timber  
25                  Management Guidelines for the Protection of Fish

1       Habitat.

2                       I am going to deal in a little bit more  
3       detail with effects to the terrestrial environment  
4       because the potentials here have a little more  
5       far-reaching effect, and I am going to be giving some  
6       evidence that's in addition to what you may have  
7       already heard or what we have already talked about in  
8       other panels. I will reference it first.

9                       Mr. Greenwood indicated that one of the  
10       effects of harvest and in renewal would be on forest  
11       diversity. And I think Mr. Euler also referenced in  
12       Panel 10 the sort of rule of thumb in wildlife  
13       management, that the more diverse the habitat is the  
14       more niches are provided for wildlife communities or  
15       wildlife inhabitants.

16                      Mr. Greenwood indicated that diversity  
17       from a forestry standpoint involves three components.  
18       One being species diversity; that is, the number of  
19       different species occurring on any particular site, and  
20       also the compositions; that is, the quantity of those  
21       species occurring on the site; and that this diversity  
22       differs within a stand, within an individual stand and  
23       also between stands.

24                      The second component of diversity as  
25       described by Mr. Greenwood indicated there was age

1 diversity within the stand and also that the third  
2 would be genetic diversity.

3 Dr. Euler indicated a fourth component,  
4 that being structural diversity. And in the sense,  
5 structural diversity is a result of the combination of  
6 age and species. Dr. Euler indicated that we are  
7 looking at structural diversity being vertical; that  
8 is, there are different levels in the forest ground  
9 vegetation, mid-canopy vegetation, and canopy  
10 vegetation that gives structural in a vertical  
11 direction in the environment, and that there is  
12 horizontal diversity that is provided by the difference  
13 from one stand to the next. And I think he talked  
14 about the edge effect being important; that is, the  
15 edge where two forest types meet each other.

16 I want to refer back to a diagram that  
17 Dr. Euler used from his evidence and that Ms. Murphy  
18 has already indicated we will be looking at. I am  
19 going to do it in the way of using the overhead.

20 This overhead is entitled: A Generalized  
21 Illustration of the Change in Wildlife as Succession  
22 Proceeds.

23 MS. MURPHY: And this, sir, was the one  
24 that is at page 540 in Exhibit 416B.

25 MR. BUSS: In this diagram Dr. Euler was

1     portraying the changes in wildlife communities; that  
2     is, the association of wildlife species as a stand  
3     develops.

4                     And if you look at the bottom where the  
5     illustration shows the plant community, we are looking  
6     at a development of plant community from a seedling  
7     stage because we have got primarily the same species  
8     shown all across the diagram, conifer species as it  
9     develops through its pole stage or its seedling,  
10    advanced growth, and finally mature growth in the  
11    stand. And this is a fairly simple succession because  
12    the plant community diversity; that is, the species  
13    diversity is not very great here in total and it's a  
14    fairly simple thing and the stand really is only  
15    developing to this mature stage over on the far right  
16    and is renewed by some sort of disturbance.

17                    And this is the kind of situation, sort  
18    of the classic situation we are dealing with in the  
19    stand development within the boreal forest. And you  
20    have heard a great deal about the fact that timber  
21    harvest is an attempt to replicate or take the place of  
22    harvest that might take place there in terms of insect  
23    or fire.

24                    In timber management we would manage a  
25    site like this in even-aged system.

1 MS. MURPHY: Q. And we are now going to  
2 look at Exhibit 630.

3 MR. BUSS: A. This diagram is entitled:  
4 A Generalized Illustration of Plant Community  
5 Succession Including Tolerant Hardwood Climax Stage.

6 A. And the reason I think it's important  
7 to look at this difference is because this is a  
8 situation, a classic situation of one plant community  
9 replacing another as succession takes place.

10 We are starting on the left of the  
11 diagram with bare soil or rock, moving through herbs  
12 and grasses to shrubs, to intolerant conifers and  
13 hardwoods, to a tolerant forest situation on the right.

14 And this succession is in response to  
15 shade tolerance, the ability of the plant community to  
16 reproduce itself in its own shade. And once that  
17 tolerant stage is reached, the stand will perpetuate  
18 itself because these species are capable of reproducing  
19 in shade, they don't need a disturbance to change that  
20 situation.

21 THE CHAIRMAN: Would there be any change  
22 in that diagram if in fact tending took place to open  
23 up some of these stands, remove some of the shade,  
24 would there be different species that would then come  
25 in?

1 MR. BUSS: Yes, there would and I will  
2 discuss in a little more detail what actually happens.

3 What I am pointing out here is that this  
4 is characteristic of the Great Lakes/St. Lawrence  
5 Forest hardwood region where tolerant hardwoods are the  
6 dominant species. And you recall from the other  
7 diagram that, given any particular stage in succession  
8 here, these communities, there is going to be different  
9 kinds of habitats provided for different communities of  
10 wildlife. I didn't bother to put them in here, but the  
11 same process that is involved.

12 In the timber management situation then,  
13 if the target species, the species that the timber  
14 management is managing for, is in this tolerant  
15 hardwood in point of succession, then an uneven-aged  
16 management system is used because regeneration is  
17 already there and you don't disturb the site, you just  
18 remove crop trees.

19 So the point then that you mentioned, Mr.  
20 Chairman, is: How does tending affect these situations  
21 and does it affect the processes differently.

22 I want to just reiterate Mr. Hynard's  
23 explanation of the purpose for tending. In an  
24 even-aged situation, the purpose of tending is to  
25 ensure the survival of the newly regenerating stand, to

1 get it to that free to grow situation and to augment  
2 it's growth rates, the rate at which the stand  
3 develops. We are talking about the first diagram now.

4 In the uneven-aged situation then,  
5 tending is designed to remove low quality trees or  
6 undesirable trees from a commercial standpoint and to  
7 improve the quality of the timber that might come off  
8 that site at harvest.

9 And in this situation we are not so much  
10 affecting the rate of succession as we are affecting  
11 the stand's structure and the composition of the stand.

12 Now, in order to assess these potential  
13 effects in terms of changes to wildlife communities, we  
14 have to look at short and long-term effects because  
15 they are different. And we also have to realize that  
16 whether these potential effects are positive or  
17 negative depends on wildlife management objectives and,  
18 to a large degree, on the association of any particular  
19 wildlife with the species being selected for or against  
20 by the tending operation.

21 They also depend -- whether these  
22 potential effects become actual depends on the success  
23 of the tending operation and the amount of area that is  
24 treated. Obviously if stand adjacent are not treated,  
25 then the effects are ameliorated by wildlife being able

1 to go to another area.

2 The potential short-term effects then.

3 MS. MURPHY: Q. Mr. Buss, just before  
4 you go there, I did have one question. You were  
5 explaining when you looked at those two diagrams that  
6 one of them shows the classic boreal situation, the  
7 other one you described as a classic Great Lakes/St.  
8 Lawrence situation.

9 In the real world, is there a variation  
10 between the two?

11 MR. BUSS: A. If you mean, is there a  
12 line which we drive across in Ontario where you go from  
13 one to the other, no. But in the sense that in the  
14 boreal forest we tend to deal with stands primarily in  
15 terms of the description of the diagram I showed, there  
16 is also a mix there.

17 There are mixed wood stands and there are  
18 hardwood stands that are managed for too, but the  
19 tendency is that there is more even-aged management in  
20 the boreal, and when we get into the Great Lakes/St.  
21 Lawrence, we are dealing with more -- sort of the  
22 classic hardwood situation, but there is always a mix  
23 of both.

24 Okay. The potential effects then on  
25 mechanical or manual tending in the boreal and

1 even-aged management is that tending initially - and we  
2 have seen a number of slides today so you know what the  
3 situation looks like - the tending initially suppresses  
4 competition, but oftentimes competition comes back.

5 Mr. Galloway gave evidence of this when he talked about  
6 the effects of manual tending; in other words, the  
7 response to the vegetation. Because the root systems  
8 aren't killed, the competing vegetation sprouts back  
9 very fast. And so we can almost say that this is a  
10 benefit, particularly if we are looking at the  
11 production of browse for herbivores.

12 There may be an initial sprouting as soon  
13 as the site has been harvested and it is planted maybe  
14 a year or two or so down the road, tending occurs, the  
15 vegetation is knocked back, it already has a root  
16 system now, the competing vegetation and it will  
17 resprout, so we get sort of a two flush in terms of  
18 competition and those competing species are often ones  
19 that are important for browse production. This is a  
20 short-term benefit.

21 In the Great Lakes/St. Lawrence, the  
22 uneven-aged management system, we generally don't see  
23 tending occur to the extent that it would change the  
24 forest succession state. In other words, we  
25 wouldn't -- if the objective was to maintain a good

1 growing stock of climax forest hardwood trees, we  
2 wouldn't tend it to the extent that we would expect to  
3 drop back to another stage in succession where we had  
4 another diversity or another plant community.

5 In other words, we would be tending to  
6 maintain that hardwood climax community at one spot.  
7 So, therefore, in the short term the changes would be  
8 negligible.

9 I mentioned we have to look at these  
10 things in terms of short term and long term and, in the  
11 long term, the potential effects in the boreal is that  
12 after we reach free to grow and as the canopy begins to  
13 close the diversity on the site, in terms of  
14 composition, we may have the same species on the site  
15 but the composition or per cent of the composition of  
16 the stand increases, the conifer component increases.

17 And for those species of wildlife that  
18 are associated with conifer-dominated stands, it is a  
19 positive effect; and for those that are associated with  
20 mixed wood stands, it could be a negative effect. So  
21 it is kind of a two-edged sword. It depends on what  
22 species of wildlife you are talking about.

23 But, at any rate, it is going to affect  
24 the rate at which the stand develops. It will develop  
25 more quickly, as we have seen from Ms. Krishka's

1 evidence, if the stand is free of competition.

2 In the Great Lakes/St. Lawrence then, the  
3 even-aged management system, there exists a slightly  
4 different situation. The long-term effects are around  
5 the structural diversity and there is a potential to be  
6 negative here. Remember that structural diversity is a  
7 complex combination of the effects of age and species,  
8 and you may lose elements of structure through  
9 improvement cutting because you are removing dead,  
10 dying or decayed trees that provide some of this  
11 structural diversity. And to the extent that you  
12 impact on species which rely on these components of the  
13 habitat, it could be seen as negative.

14 Treatments which increase the rate of  
15 stand development or perpetuate then the existence of  
16 these tolerant hardwood communities could be seen to  
17 truncate wildlife community. And depending on your  
18 overall objectives for the area that is for wildlife,  
19 this could be -- have a negative impact.

20 Overall then, wildlife objectives at this  
21 point are broad except for threatened, endangered  
22 species and for provincially significant species or  
23 locally featured species and they are dealing with  
24 viable populations, as Dr. Euler has indicated.

25 And over most of a management unit we

1 wouldn't expect that the application of mechanical and  
2 manual tending would have an adverse effect because all  
3 stands aren't treated at once, because harvest and  
4 other forest management activities occur in rotations  
5 so that the differences between stands remains fairly  
6 diverse. So our between stand diversity is maintained.

7 And even in the Great Lakes/St. Lawrence  
8 Forest region where there is some potential to impact  
9 on structural diversity by improvement cutting, there  
10 is interspersed in with these hardwood communities  
11 many, many stands, many, many situations where the  
12 stands represent boreal conditions and are, therefore,  
13 managed as boreal. So we still have a wide diversity.

14 And I am sure on your site visits you  
15 have seen and understand just how diverse and complex  
16 the situation is in regard to that.

17 Q. When you are talking about this  
18 potential long-term effect, are you thinking about this  
19 at the stand level or at the forest level?

20 A. I am primarily talking about the  
21 stand level.

22 Q. What's the significance of that?

23 A. Well, it is significant for species  
24 that may have small home ranges; in other words, they  
25 may be displaced from that stand while those effects

1 are taking place. For animals with larger home ranges,  
2 they will just move to another area, to an adjacent  
3 area where tending has been done in the past or has not  
4 taken place.

5 Q. So again you have to look at the  
6 particular species that you are concerned with?

7 A. You have to look at the species and  
8 you have to look at the amount of area that is being  
9 treated, and you have to realize that there is varying  
10 degrees of success within the tending projects.

11 In terms of mitigating, and I like to  
12 think about the enhancement of these tending  
13 activities, how they can enhance wildlife objectives or  
14 preventing detrimental effects, we need to look at the  
15 mechanisms that are currently in place to respond to  
16 these potential effects.

17 The timber management planning process is  
18 designed to accommodate wildlife managers and to ensure  
19 that activities and disturbances related to timber  
20 management can be used to enhance or at least minimize  
21 potentially detrimental effects to habitat where the  
22 objectives of wildlife management could be seen to be  
23 compromised by tending activities. This is true for  
24 harvest, it is true for renewal, and it is true for  
25 tending activities or maintenance activities.

1                   Now, on the part of the Great Lakes/St.  
2       Lawrence Forest region where the Frost Centre is, the  
3       Forest Centre Management Unit - the one that I am  
4       currently working on or just leaving - tending is a  
5       component of almost every harvest operation that goes  
6       on.

7                   In fact, if you look at the allocation  
8       maps for harvest it is almost exactly the same as the  
9       allocations or the intentions for maintenance  
10      activities because they are done by and large at the  
11      same time in the stand. That's when you have a  
12      selection cut going on, part of that cut will involve  
13      the tending of that stand as well.

14                  In developing our timber management plan,  
15      the one that we are currently developing at the Frost  
16      Centre - and it is not complete at this point - but we  
17      are developing information that will be used in  
18      designing the prescriptions for tending, as well as  
19      harvest and renewal.

20                  Now, you are going to hear in detail  
21      about the planning process in Panel 15 and I don't  
22      intend to deal with it in detail here, but I thought it  
23      might be instructive or helpful to see how we make the  
24      decisions and what information we use to base the  
25      decisions on in order to deal with tending as it

1 affects wildlife objectives.

2 My first example is that currently in the  
3 Algonquin Region and on the Frost Centre Management  
4 Unit we have a locally featured species, it is a rare  
5 species, red-shouldered hawk, and this past spring,  
6 over about the last four or five weeks, we have  
7 conducted a survey, a search in the stands allocated in  
8 the next harvest period to locate red-shouldered hawk  
9 nests.

10 These birds, as you have heard from Dr.  
11 Euler, are sensitive to disturbance and changes to  
12 canopy structure. They nest in hardwood forests, in  
13 that hardwood forest that I showed on that diagram at  
14 the right end.

15 We will be treating these areas as areas  
16 of concern and special operating prescriptions will be  
17 applied as they are indicated by the resource manuals  
18 and guidelines that deal with the species. Basically  
19 they will address the topics of tending or tending in  
20 terms of its timing and the intensity of tending that  
21 might go on adjacent to those nest sites.

22 I would like to note that -- and I make  
23 this point in my evidence, but I think it is important  
24 and it is one of the messages that I hope the Board  
25 takes away from this presentation, and that is that the

1 timber management planning process by and large is an  
2 excellent vehicle to deal with these concerns.

3 It brings them to the forefront, makes  
4 people aware of them, but the results that we can  
5 expect in the field based on these prescriptions is  
6 very much dependent on how people, our technical and  
7 professional staff apply these prescriptions in the  
8 field.

9 It is one thing to have a rule in a  
10 document and it is a very different thing to visualize  
11 how that rule is going to be impacted when you actually  
12 put it on the land. I want to give you an example to  
13 show you just how this relates to a tending activity  
14 that occurred on the Frost Centre Unit a number of  
15 years ago.

16 In a previous plan we had designed a  
17 project that was especially designed -- started out or  
18 initiated to include as many values as we could; in  
19 other words, it was identified as a truly integrated  
20 harvest and prescription. It took place in a winter  
21 deer yard and in this part of Ontario where the Frost  
22 Centre Unit is located, it is just south of Algonquin  
23 Park, north of Peter Hynard's - actually part over on  
24 the edge of Peter Hynard's unit.

25 There is a deer yard and the species of

1 trees that provides the cover, the shelter for deer  
2 there is hemlock. And the cut was going to take place  
3 within that area of concern, part of that hemlock stand  
4 that had been identified as a deer yard. And so our  
5 prescription for the cut indicated that where a marker  
6 found three hemlock trees whose branches were  
7 interlocking, three or more hemlock trees whose  
8 branches were interlocking, that we didn't want -- we  
9 wanted to preserve those hemlock; they were not to be  
10 cut.

11 If there was a hemlock tree out in the  
12 middle of 50 hectares of hard maple, one hemlock tree  
13 standing there, we didn't feel it was significant and  
14 if it was eligible for harvest, then that was up to the  
15 marker to mark it that way.

16 Along with this prescription was a  
17 prescription for tending; in other words, the removal  
18 of undesirable trees, form or species, to remove them  
19 from the growing stock to allow for the development of  
20 better crop trees.

21 I went into the stand during the  
22 operation and looked at a large red maple that had been  
23 marked for felling, it wasn't a commercially viable  
24 tree but it was marked as part of the tending to remove  
25 it from the growing stock, and this red maple was

1 standing in the middle of three hemlock trees, actually  
2 more hemlock trees.

3 When the logger felled the tree, it fell  
4 against the hemlocks, the top - this was a large red  
5 maple - and in so doing, when it slid down the hemlock  
6 trees, it effectively cleaned off most of the limbs of  
7 the hemlock trees, therefore, rendering their value as  
8 deer shelter to almost nil.

9 So you see on paper we said: We were  
10 protecting the hemlock trees because it was a deer  
11 yard, but the marker didn't have in his mind -- we  
12 weren't specific enough and he didn't have in his mind  
13 the idea that: Well, if I cut this tree or mark it for  
14 cutting, it could damage these hemlock trees and render  
15 them useless for shelter, he just knew that part of the  
16 marking was to get rid of these trees that were  
17 non-commercial.

18 What he could have done, had our  
19 instructions been a little more specific or he  
20 understood exactly what we were trying to do, was to  
21 have girdled that tree. It would have effectively  
22 removed it from the stand, but it would have taken it a  
23 number of years to die and as it rotted it would have  
24 fallen apart a limb or two at a time and come down and  
25 not damaged the residual hemlocks that were important

1 for shelter.

2 Now, we resolved that problem during the  
3 operation and we have also resolved it by including it  
4 in the training that we do for tree markers. And  
5 training has become an important part of what wildlife  
6 biologists are doing in the Algonquin Region and the  
7 timber people are encouraging our participation and we  
8 are glad to be a part of it because it resolves some of  
9 these problems.

10 Q. And you talked about those  
11 instructions. In your view, could you ever make those  
12 written instructions clear enough and detailed enough  
13 to meet every potential misunderstanding?

14 A. I don't believe so. It is important  
15 to recognize that the planning process needs to be  
16 responsive to local conditions, and creating rules  
17 about practices useful in one area and applying them  
18 over the entire area of the undertaking are very likely  
19 going to be unnecessary restrictions on timber  
20 management and other areas.

21 It makes the process cumbersome and it  
22 would very likely, and does divert efforts from making  
23 proper decisions based on actual site-specific  
24 knowledge.

25 For example, hemlock is not a preferred

1 cover species in all parts of deer range in Ontario and  
2 prescriptions for operations in deer winter habitat  
3 might very well be different for that reason in other  
4 parts of the deer range. So if we have a rule about it  
5 in one place, it may not be something that even needs  
6 to be considered in another. You have to deal with the  
7 specific conditions on any particular site.

8 I would like next to turn to the  
9 potential socio-economic effects of manual and  
10 mechanical tending.

11 Q. It was noted that you didn't provide  
12 a series of tables, as has been done in the previous  
13 panels, in Panel 10 and 11. Did you consider doing  
14 that, Mr. Buss?

15 A. Just for a moment. I think we have  
16 seen enough tables about that regard, but I did look at  
17 the evidence and other experience, drawn upon my own  
18 experience in my relationship to some of the  
19 stakeholders and I looked at the evidence dealing with  
20 the effects of harvest and renewal, as described by Mr.  
21 Clark. And I am not going to reiterate the information  
22 presented by Mr. Hynard and Mr. Galloway in terms of  
23 the economics of tending and what it means to the  
24 forest industry because I think those things were well  
25 explained and well documented in terms of wood supply

1 and wood quality.

2 I will make mention of the economic  
3 effects in terms of economic activity in the area of  
4 the undertaking in terms of it being minor but additive  
5 to the other management activities that take place.

6 And just as an example of that, I am  
7 aware that in the Bancroft District there are about 400  
8 heads of household or families who depend on the  
9 primary woods industry for income; that is, harvesting  
10 and milling. And of those 400 families in any year  
11 about five to seven could be classified as making their  
12 primary income from the activities of manual/mechanical  
13 tending; in other words, there is about five of those  
14 workers make their living by bidding on and conducting  
15 tending treatments. So it is minimal, but additive to  
16 the expenditures in forest management.

17 The other stakeholders who may be  
18 affected are those stakeholders who have an interest in  
19 wildlife from a recreational or commercial point of  
20 view, and given that tending can affect wildlife  
21 habitat in the ways I have explained here and,  
22 therefore, affect wildlife, there can be some interest  
23 here.

24 I talked about the potential short-term  
25 effects as being either negligible or positive for most

1 wildlife, beneficial to some. In the Great Lakes, in  
2 the hardwood forest communities, they can be considered  
3 as negligible or positive in terms of browse production  
4 and perhaps there exists a potential for negative  
5 effects in terms of structural diversity.

6 In the boreal forest, the quicker return  
7 to mature conifer situation that would be stimulated by  
8 tending activities could be seen to be either positive  
9 or negative, depending on which species you are looking  
10 at. I will use an example. There exists evidence in  
11 the literature and from our own experience that the  
12 harvest of large blocks of mature conifer timber has an  
13 effect on marten populations, marten being an important  
14 furbearing species in the boreal forest.

15 And if tending would tend to speed the  
16 return to that conifer-dominated stand that marten so  
17 like, that therefore you could judge it as being a  
18 positive effect for marten.

19 If you were concerned about another  
20 furbearer, for instance the red fox or perhaps lynx,  
21 the return to a conifer-dominated stand might not be  
22 positive because these carnivores depend on small  
23 mammals that are associated with diverse sites and a  
24 heavy degree or fair degree of deciduous plants.

25 When these concerns are addressed and

1 identified - we are dealing here primarily with  
2 potential effects - wildlife managers are aware of them  
3 and can deal with them through the timber management  
4 planning process in a way of mitigating any of the  
5 negative effects that might result.

6 Q. I think that's really the end of the  
7 evidence that you were planning to lead in-chief,  
8 unless you had any other information or comment you  
9 wanted to make before you completed?

10 A. I did want to mention briefly,  
11 because it was addressed in an interrogatory or under  
12 issues through the scoping session, the adequacy of  
13 information to deal with these questions.

14 And I want to point out that it is very  
15 difficult to separate the effects of tending from other  
16 forest management activities because tending is  
17 really - in terms of its extent and its intensity - is  
18 much less than harvesting, and it is very hard to  
19 separate them, to measure them, particularly in an  
20 aquatic sense, and that's why there is so very little  
21 literature about it; except for thinning, there is some  
22 literature dealing with thinning which I had discussed.

23 At the present, given the objectives of  
24 wildlife management, given that they are broad in  
25 nature, I believe there is sufficient information

1 exists to deal with decisions about manual and  
2 mechanical tending through the TMP process. Where  
3 values are identified in OACs, areas of concerns, and  
4 the mechanisms for developing prescriptions for them  
5 are applied, we don't think there is a great deal of  
6 problem.

7 In a large degree, these decisions are  
8 based on our understanding of the natural processes  
9 that are taking place and that are at work in a forest  
10 community and they are augmented by local,  
11 site-specific information.

12 So, in other words, if we had more  
13 information - everybody would like to have more  
14 information - I don't think, given our objectives, we  
15 could apply it with a great deal more vigor than we are  
16 right now.

17 I also think it is instructive that the  
18 Board is aware, and I am sure they are to a certain  
19 degree, but from my point of view to understand that  
20 this process has been evolving, the timber management  
21 planning process has been evolving over a long period  
22 of time.

23 When I started with the Ministry of  
24 Natural Resources some 23 years ago I was aware that  
25 timber management took place, you couldn't live in

1 northern Ontario without knowing that, but I wasn't  
2 aware of the planning process, or if there was one.

3 And in the intervening 20 some years, I  
4 have worked in the Sioux Lookout District where I  
5 became aware of the planning process and also became  
6 involved as a member on a planning team, but our input  
7 and the ability to input into the plans was not to a  
8 large degree, there wasn't a great amount of  
9 opportunity. And in the last two or three plans that I  
10 have been involved with in the Algonquin Region, there  
11 has been considerably more opportunity for input, both  
12 in identifying values and with direction in terms of  
13 how to deal with those values to protect them. So.

14 The process is evolving and we are able,  
15 through this process, to inject new information and new  
16 technologies as they occur.

17 THE CHAIRMAN: Thank you.

18 MR. BUSS: Thank you.

19 MR. FREIDIN: Mr. Chairman, Mr. Churcher  
20 will easily finish his evidence this afternoon if we  
21 broke for lunch early and did all of his evidence as a  
22 block this afternoon.

23 I am prepared to start now, or we could  
24 break now and start after the lunch break.

25 THE CHAIRMAN: All right. Will you be

1 concluding with Mr. Churcher this afternoon, or is  
2 there another?

3 MR. FREIDIN: No. We will just do Mr.  
4 Churcher today and then that just leaves Mr. Nicholson  
5 and Mr. Iskra for tomorrow.

6 THE CHAIRMAN: Okay. And if we start  
7 them at 8:30 tomorrow do you plan to finish by an early  
8 hour?

9 When do you have to leave, Ms. Cronk?

10 MS. CRONK: I am actually leaving this  
11 evening, sir. Mr. Cassidy is coming in.

12 THE CHAIRMAN: Oh, I see. Okay.

13 MS. CRONK: Thank you.

14 MR. FREIDIN: What time do you want to  
15 leave, that may have some effect?

16 THE CHAIRMAN: Well, I think if we don't  
17 leave by 11:30 we are stuck until 5:10 or something, so  
18 we don't have a choice anyways, except for Mr. Martel  
19 can get out at two but we can't.

20 MS. MURPHY: Well, if we start at 8:30 I  
21 can't really undertake that we would be finished at  
22 11:30, I know we will be finished by one.

23 THE CHAIRMAN: No, we understand that.  
24 So we were not really planning to get back any earlier  
25 than the normal time tomorrow.

1                   So as far as this afternoon goes, you  
2                   should be able to be finished with Mr. Churcher by what  
3                   time if we started, say, at 1:30?

4                   MR. FREIDIN: If we started at 1:30 I  
5                   think we should be out of here by 3:30. I don't see  
6                   him taking -- I was going to say an hour and a half to  
7                   two and a half - so it could be three o'clock, it could  
8                   be four o'clock.

9                   THE CHAIRMAN: All right. Well, why  
10                  don't we -- if you want to file your documents relative  
11                  to his presentation now and then we will break for  
12                  lunch.

13                  MR. FREIDIN: Sure. Well, let's start  
14                  out with the interrogatories that I would like to file  
15                  that are sort of related to Mr. Churcher's evidence.  
16                  It's a package which contains the following  
17                  interrogatories, all from Panel 13.

18                  From the OFIA/OLMA, Interrogatories Nos.  
19                  6, 7, 8, 13, 19 and 29 - Mr. Churcher, perhaps you can  
20                  correct me if you have got your list there - from the  
21                  Ministry of the Environment, Interrogatories 5 and 8;  
22                  and from Forests for Tomorrow Nos. 17, 18, 21 and 30.

23                  THE CHAIRMAN: Okay. That will be  
24                  Exhibit 632.

25                  ---EXHIBIT NO. 632: OFIA/OLMA Interrogatory Nos. 6,

1 7, 8, 13, 19 and 29; Ministry of  
2 the Environment Interrogatory Nos.  
3 5 and 8; and Forests for Tomorrow  
Interrogatory Nos. 17, 18, 21 and  
30 and answers thereto. (Panel 13)

4 MR. FREIDIN: The next exhibit will be  
5 hard copy of five overheads which will be used by Mr.  
6 Churcher. The pages aren't numbered, Mr. Chairman, but  
7 I would just suggest we give the exhibit one number and  
8 just perhaps mark the pages again.

9 THE CHAIRMAN: A, B, C, D and E?

10 MR. FREIDIN: Yes.

11 THE CHAIRMAN: Very well. Exhibit 633.

12 MR. FREIDIN: (handed)

13 THE CHAIRMAN: Thank you.

14

15 ---EXHIBIT NO. 633: Hard copy of five overheads  
16 to be used by Mr. Churcher in his  
evidence-in-chief.

17 MR. FREIDIN: And the last document I  
18 would like to file is basically a replacement or an  
19 amended page 107 of the witness statement for Panel 13.  
20 I believe that's exhibit...

21 THE CHAIRMAN: 604.

22 MR. FREIDIN: 604A.

23 THE CHAIRMAN: Thank you. Exhibit 634.

24 ---EXHIBIT NO. 604: Amended page 107 of the witness  
25 statement for Panel 13.

1 THE CHAIRMAN: Do you want to point out  
2 at this point what the changes are?

3 MR. FREIDIN: Well, I can't point out the  
4 particular changes and Mr. Churcher doesn't have that  
5 information here.

6 Really what it is, is that there were  
7 some numerical errors I think in the hectares treated,  
8 so the numbers were corrected and, therefore, the  
9 percentages had to be changed. So it was just a matter  
10 of changing some numbers so that they would be an  
11 accurate reflection of the information.

12 MS. MURPHY: The document does indicate  
13 revised March 9, 1989 at the bottom, so that it's  
14 possible to tell which page is the amended page when  
15 you put it in the document.

16 MR. CHURCHER: And I can provide the  
17 exact changes, if you like, when we return after lunch.

18 THE CHAIRMAN: Okay.

19 MR. FREIDIN: Okay. That's all, Mr.  
20 Chairman.

21 THE CHAIRMAN: Very well. We will break  
22 until 1:30.

23 MR. FREIDIN: Thank you.

24 THE CHAIRMAN: Thank you.

25 ---Luncheon recess taken at 11:55 a.m.

1 ---On resuming at 1:40 p.m.

2 THE CHAIRMAN: Thank you. Be seated,  
3 please.

4 MR. FREIDIN: Mr. Chairman, in relation  
5 to Exhibit 634 which was the replacement for page 107  
6 of the witness statement, we can provide those  
7 differences now orally, or is that something you are  
8 still interested in?

9 THE CHAIRMAN: Well, if they are not --  
10 are there a lot of changes, because we could just  
11 change them on the original sheet so that they are  
12 within the witness statement itself, otherwise we will  
13 leave it the way it is.

14 MR. FREIDIN: 12 changes I wrote.

15 THE CHAIRMAN: Yes., I think, if you  
16 wouldn't mind just running through them very quickly.

17 MR. CHURCHER: Okay.

18 MR. FREIDIN: So we are looking at the...

19 MR. CHURCHER: Page 107 of Volume I of  
20 the evidence package -- evidence statement for Panel  
21 13. The first set of changes I will talk about are in  
22 the third column titled: Hectares Treated.

23 The figure provided for 1977 is listed as  
24 6,658. The actual number should be 6,820.

25 Further down the column for the year

1 1981, the figure there is 9,972. The real -- the  
2 correct figure is 10,234.

3 For 1983 the total hectarage listed is  
4 3,801. The correct figure is 4,081.

5 For 1984 the number was incorrectly given  
6 as 3,288. It should be 3,697.

7 And the final correction in that column  
8 is in the year 1985. The figure provided was 249,540.  
9 The actual number should be 250,380.

10 Now, because there are changes there,  
11 that affects the percentages that I calculated in some  
12 of the corresponding columns.

13 In the year 1978, the percentage of BT  
14 use versus chemical was provided as 62 per cent BT, 38  
15 per cent chemical. That should be 54 per cent BT, 46  
16 per cent chemical. These percentages should still add  
17 up to a hundred.

18 For 1980 it was at 49 per cent BT, 51 per  
19 cent chemical. The correct is 42 per cent BT, 58 per  
20 cent chemical,

21 In 1981 the figure provided was 70 per  
22 cent BT, 30 per cent chemical. In actual fact it is  
23 68 per cent BT, 72 per cent chemical.

24 MR. FREIDIN: Q. 32.

25 MR. CHURCHER: A. 32. Thank you, Mr.

1 Freidin.

2 And the final correction is for the year  
3 1983. Instead of 89 per cent BT and 11 per cent  
4 chemical, it should be 78 per cent BT and 22 per cent  
5 chemical.

6 THE CHAIRMAN: Thank you.

7 DIRECT EXAMINATION BY MR. FREIDIN:

8 Q. Okay. Mr. Churcher, could you advise  
9 the Board what the main messages or the main topics  
10 that you are going to cover today in your evidence?

11 MR. CHURCHER: A. There are eight main  
12 messages. I will be leaving that overhead up for the  
13 majority of my presentation so that we can refer to it.

14 The first major message is one that I  
15 believe the Board has heard before, that insects and  
16 diseases are a major depletion factor in the life of  
17 the forest. I will briefly go through all eight of  
18 these and then come back and speak in a little more  
19 detail to each one.

20 The second message is that there is  
21 limited options available to us as far as disease  
22 control is concerned, however, there are more options  
23 for insect control and insect control techniques are  
24 more commonly used and implemented.

25 At the present time, 1989, there are four

1 major forest insect pests of concern. I will be  
2 talking about those and using those as examples  
3 throughout the discussion this afternoon.

4 The fourth message is that there are six  
5 alternatives that can be used when managing these  
6 insect pests.

7 The fifth message is that some of these  
8 six methods are more long term in scope and others are  
9 more shorter. The short-term ones tend to address the  
10 insect pest directly, so you are managing the pest by  
11 treating the pest, if you will; whereas the more  
12 long-term techniques affect the insect indirectly, you  
13 are essentially treating the forest and, in that way,  
14 attempting to manage the insect pest.

15 And the sixth message is that  
16 insecticides and the use of insecticides is one of the  
17 direct short-term control techniques that we use to  
18 affect the insect directly.

19 The seventh message will be an  
20 interpretation and an explanation of the results that  
21 we receive after conducting an insecticide spray  
22 program.

23 And lastly, the eighth message is a  
24 discussion on how insect populations are monitored and  
25 I will talk about the cooperation between the Ministry

1 of Natural Resources and Forestry Canada in conducting  
2 the monitoring of insect populations across the  
3 province.

4 So back to the first message. I believe  
5 Mr. Gordon in Panel 4 talked about insects and diseases  
6 as a depletion factor as well as fire, and in my  
7 evidence as well I have talked about that. And just to  
8 put it in perspective, one study that was conducted  
9 between 1977 and '81 - which I believe are the same  
10 numbers that Mr. Gordon used to derive some of his  
11 factors - indicated that in Ontario on an annual basis  
12 roughly 15-million cubic metres of wood was lost to  
13 insects each year.

14 In the same period of time on an annual  
15 basis diseases accounted for a loss of 30-million cubic  
16 metres. And for the same time period, 77-81, roughly  
17 18-million cubic metres of wood was harvested on an  
18 annual basis.

19 So insects and diseases account for  
20 almost three times as much on an annual basis,  
21 depletion, as what is actually harvested in the forest.

22 MR. FREIDIN: Mr. Chairman, you will find  
23 the statistics for the time period 77-81 on page 123 of  
24 the witness statement.

25 Q. It's Table 5 from I believe the

1 report that you were referring to.

2 MR. CHURCHER: A. Yes, that's correct.  
3 It's a report prepared by Dr. Henry Gross of the  
4 Canadian Forestry Service, Great Lakes Forestry Centre  
5 in Sault Ste. Marie.

6 MR. FREIDIN: And you will note that the  
7 title page of that particular report is at page 116 of  
8 the witness statement.

9 Q. And, Mr. Churcher, I understand you  
10 don't propose to go through that table?

11 MR. CHURCHER: A. No, I don't.

12 Q. Okay.

13 A. Unless the Board would like me to.

14 THE CHAIRMAN: No, I don't think it's  
15 necessary.

16 MR. FREIDIN: Q. Okay. All right. So  
17 we can move on then to the second message, Mr.  
18 Churcher.

19 MR. CHURCHER: A. There are essentially  
20 limited opportunities for controlling diseases in the  
21 forest. And in the Environmental Assessment Document  
22 it often talks about insect/disease control or the use  
23 of insecticide/fungicide. However, in actual fact, the  
24 most common practice when we are dealing with pests,  
25 insects and diseases, is to control the insects and

1       there are very rare occasions when you have an  
2       opportunity to control diseases.

3                       For this reason, the vast majority of the  
4       evidence that has been presented and has been filed  
5       deals with insects and insect management and the use of  
6       insecticides.

7                       There are occasions when you can control  
8       diseases, but those occasions are normally and very  
9       specific circumstances or when the disease occurs in a  
10      discreet area.

11                      An example of that is the discovery in  
12      1985 I believe of a new more virulent strain of a  
13      disease called Scleroderris canker. This was a  
14      European race, it occurred in a plantation, pine  
15      plantation and because it was very localized in one  
16      plantation they were able to go into that plantation to  
17      cut down the plantation, sanitize it, burn it, went  
18      back the following spring and burnt it again to make  
19      sure that there was no over wintering pathoges.

20                      In that type of situation, you can deal  
21      with the disease. However, as far as the vast majority  
22      of Ontario is concerned, the productive forests in  
23      Ontario, diseases are throughout the forest in the form  
24      of root rots and butt rots and decay in the stems and  
25      it is very difficult to deal with or control those

1 types of diseases.

2 THE CHAIRMAN: Would the epidemic, if you  
3 might call it that, of Dutch elm disease a few years  
4 ago be an example of where measures were at least  
5 attempted to control a disease like that?

6 MR. CHURCHER: Yes, that would be a good  
7 example and in that case you pick specific trees that  
8 you were trying to protect and protected those, but  
9 because the epidemic was so wide spread and because it  
10 is difficult to treat diseases, you couldn't go to each  
11 elm tree and inject it with the fungicide that would  
12 kill the disease.

13 MR. FREIDIN: Q. Could you advise: Is  
14 disease control addressed in any way over the long  
15 term?

16 MR. CHURCHER: A. Well, as I was saying  
17 the diseases are a part of the forest eco-system and  
18 tend to be taken into account in the growth and yield  
19 tables of the forest. What you expect out of the  
20 forest includes those losses of disease.

21 However, the best way of dealing with  
22 diseases and limiting their impact is to ensure the  
23 overall health and viability of the forest. So a  
24 healthy forest or one that is growing on good sites and  
25 that is being taken care of properly, the diseases will

1 have less of an impact.

2 Q. Now, your next message, Mr. Churcher  
3 customer, is going to deal with the four insects of  
4 current concern and I understand to some extent you  
5 will be up dating the Board in relation to the series  
6 of maps which were shown by Mr. Armson in Panel 2  
7 dealing with spruce budworm?

8 A. That's correct. And the first map  
9 that I would like to use I believe is the second  
10 overhead that was passed out prior to lunch.

11 MR. FREIDIN: Mr. Chairman, just for your  
12 reference, the 1967 -87 maps which precede the one  
13 which is now up on the overhead are found in the Panel  
14 2 witness statement at pages 59 to 79.

15 THE CHAIRMAN: Thank you.

16 MR. CHURCHER: This map that I have on  
17 the overhead right now is the 1988 defoliation map, in  
18 other words the map that was produced last summer, and  
19 the area that is marked in orange, mainly in  
20 northwestern Ontario is the area that was mapped by the  
21 Forest Insect and Disease Survey of the Canadian  
22 Forestry Service, now Forestry Canada as having or  
23 suffering moderate to severe defoliation as a result of  
24 the spruce budworm.

25 The total area that was mapped there is

1 indicated in the bottom left-hand corner and is noted  
2 as being 5.2-million hectares. That is the number of  
3 hectares or the amount of area that was affected for  
4 that one year, 1988. And in those maps that Mr. Armson  
5 used, each of the figures that was provided was the  
6 figure for that specific year.

7 By looking at the maps and the  
8 progression from '67 I believe it was where Mr. Armson  
9 started to now you can see the rise and fall of the  
10 epidemic and this is just the updated map for '88.

11 What we expect to see and over the next  
12 few years, if I can give a long-term forecast, which is  
13 as tricky in entomology as it is in weather, we would  
14 expect to see a continued decline in the budworm  
15 epidemic in northwestern Ontario progressing roughly in  
16 a east to west direction.

17 So the area to the north of Lake Superior  
18 will break up and collapse first and the larger of the  
19 two centres or areas west of Thunder Bay and to the  
20 Manitoba border will then progressively break down from  
21 east toward -- west towards the Manitoba border.

22 The second map that we provided is a  
23 similar map giving similar information.

24 MR. FREIDIN: Q. This is Exhibit 633C I  
25 believe. Jack pine, yes.

1 MR. CHURCHER: A. That would be correct.  
2 And, as Mr. Freidin indicated, this map talks about the  
3 jack pine budworm in 1988.

4 And in '88, there was a total of 736,000  
5 hectares suffered moderate to severe defoliation  
6 almost entirely in the northwestern region of Ontario,  
7 split between the Red Lake and Sioux Lookout districts.  
8 This is in fact the remnant of the larger jack pine  
9 budworm infestation that occurred in northwestern  
10 Ontario a couple of years prior to that from '85 to  
11 '87.

12 And of course, at that same time,  
13 actually beginning in '84 and running until about '86,  
14 there was a similar large area infestation in the  
15 northeastern and northern regions as well of jack pine  
16 budworm. That as you can see has totally disappeared.  
17 As is the nature of this particular insect, the  
18 epidemics are reasonably short lived, but in the  
19 northwest we still have a remnant of that infestation.

20 I would also like to mention now that  
21 there were two small pockets to the western portion of  
22 the Thunder Bay District, they were a few hundred  
23 hectares and too small to show up on this scale of map,  
24 however, because they are small and isolated and they  
25 are on the edge of a large area -- expansive area of

1 mature jack pine, there was concern that they were  
2 going to spread from that point throughout the jack  
3 pine. And because of that, that is the location of our  
4 jack pine budworm spraying programs for this year,  
5 1989, which should commence within a week or 10 days.  
6 And the idea there is to take care of those small  
7 pockets of jack pine before they spread throughout the  
8 area and I will talk about that a little bit later.  
9 But that is the location of where those pockets are.

10 The next map talks about gypsy moth I  
11 believe, is a map of southern Ontario because that is  
12 where gypsy moth is causing the damage in the province.  
13 And as noted in the bottom right-hand corner, in this  
14 case, in last summer there was almost 30,000 hectares  
15 suffered moderate to severe defoliation by the gypsy  
16 moth.

17 And as you can see, it's number of small  
18 scattered pockets mainly in southeastern Ontario with a  
19 few small pockets in our Niagara District and also in  
20 our Simcoe District. There was an interrogatory by  
21 Forests for Tomorrow, I believe Interrogatory No. 17--

22 Q. That's correct.

23 A. --asking as to how much of this area  
24 was actually in the area of the undertaking. And the  
25 southern border, if you will, of the area of the

1       undertaking follows -- the divided southern line of  
2       Algonquin Region along here. It also takes in Tweed  
3       District and then roughly half of Carleton Place  
4       District, in fact Lanark County -- all of Lanark  
5       County. So it would just be these dots in this area as  
6       well as the dots in the area of defoliation that are  
7       located in Algonquin Region that would be included in  
8       the area of the undertaking.

9               And in the response to that interrogatory  
10       from Forests for Tomorrow, I broke down what the total  
11       provincial picture as opposed to what the area of the  
12       undertaking that was defoliated.

13              The final map talks about an insect that  
14       is near and dear to the hearts of many people at the  
15       moment; namely, the forest tent caterpillar. Again in  
16       1988 - this is a map for '88 - there was almost  
17       4-million hectares of the province that was moderately  
18       or severely defoliated by this insect and we are  
19       beginning -- still on the upward end of a cycle for  
20       this particular insect.

21              That number is expected to increase  
22       fairly dramatically in 1989, and we are expecting - and  
23       from all the telephone calls and reports I have so far,  
24       we are experiencing - much of the same area that was  
25       defoliated in '88 is being defoliated again, as well as

1 a continuation down around the southern portion of  
2 Georgian Bay up the Bruce Penninsula and a further  
3 extension of this arm, if you will, that starts in  
4 Sudbury down through the Muskokas and the Haliburtons  
5 and the Kawarthas over -- north of Kingston, that is I  
6 believe extending almost as far as the Ottawa valley  
7 now as would be the case, as we would expect, as this  
8 infestation progresses and moves from the west/east  
9 direction.

10 Q. And you indicated what the forecast  
11 is for next year. Are you able to forecast beyond  
12 that?

13 A. For this coming year, 1989, this is  
14 what I was speaking about. Beyond that, again the  
15 forecast is about as definite as what the weather is  
16 going to be like tomorrow.

17 However, for those of you that may have  
18 cottages in the Muskokas, you can -- and Parry Sound  
19 specifically where the infestation has been there the  
20 longest, I would think that this may very well be the  
21 last year of defoliation.

22 As you get farther into the Muskokas  
23 around the Bracebridge/Gravenhurst area, you may likely  
24 have one more year of nuisance and defoliation by there  
25 this pest. But the epidemic should begin down by 1991.

1                   And, again, as you move in a more  
2   easterly direction, the Kawarthas had their first  
3   experince basically last year, they probably have two  
4   if not three more years to look forward to and so on as  
5   we move east towards Quebec.

6                   THE CHAIRMAN: Mr. Churcher, are these  
7   four insect infestations interchangeable in the sense  
8   you finish with one, are you into one of the other  
9   three in the same areas? Do they sort of cycle  
10  themselves so that you might have trouble with from at  
11  least one all the time?

12                  MR. CHURCHER: That seems to be the case  
13  in these four particular pests. As the spruce budworm  
14  is declining in one part of the province, it may very  
15  well be increasing in another part of the province.  
16  And in fact that is something that we are beginning to  
17  see in southern Ontario is the first indications of an  
18  increase in the spruce budworm population in southern  
19  Ontario, much as Mr. Armson was talking about in 1967,  
20  '68, '69.

21                  That infestation has come and gone but  
22  the next infestation seems to be coming.

23                  THE CHAIRMAN: Will something else as  
24  well move in?

25                  MR. CHURCHER: It is quite likely. There

1 are other pests such as the oak leaf shredder that we  
2 have dealt with in the past that are not causing us a  
3 problem at the moment, but they may very well keep us  
4 occupied when the forest tent caterpillar has done its  
5 thing.

6 It's a way that entomologists make sure  
7 that they always have a job to do on an annual basis.

8 THE CHAIRMAN: That's the way the insects  
9 make sure that they are always out there doing their.  
10 thing too, I suppose.

11 MR. CHURCHER: Quite likely.

12 MR. FREIDIN: Q. And if you have one of  
13 those situations where you just get rid of spruce  
14 budworm in a particular area and another insect comes  
15 in, am I correct that it will probably target a  
16 different species of tree than the spruce budworm,  
17 although it will be back into the same general area as  
18 the spruce budworm were?

19 MR. CHURCHER: A. Yes, that is quite  
20 true. If we look at the maps in northwestern Ontario,  
21 for instance, the spruce budworm and jack pine budworm,  
22 if I overlaid those two maps, you would see that there  
23 were some areas at any rate where there was an overlap,  
24 maybe not so much in 1988, but in '86 and '87 there  
25 would be an overlap in those defoliation areas where

1 the jack pine budworm is hitting the jack pine in the  
2 area and the spruce budworm is munching on the spruce  
3 and fir in the area.

4 However, I can think of, in Newfoundland  
5 for instance, who have just recently gone through a  
6 spruce budworm outbreak, that came and went. Almost  
7 immediately on its heels was an outbreak of another  
8 insect the eastern hemlock looper which, although its  
9 preferred host is hemlock, it also likes to feed on  
10 balsam fir as well.

11 So those stems of balsam fir that had not  
12 been killed by the spruce budworm and that managed  
13 survive that outbreak, were then fed upon by the  
14 eastern hemlock looper as well which placed the  
15 Province of Newfoundland in a somewhat precarious  
16 position as far as the forest industry is concerned.

17 Q. And later in your evidence you will  
18 be using the phrase host or host tree species. What is  
19 that?

20 A. That is the tree species that the  
21 insect pest will feed on. The spruce budworm has three  
22 major hosts, or three tree species that it eats or the  
23 foliage that it eats being, balsam fir, white spruce  
24 and black spruce.

25 Could I have the lights back on, please?

1                   Q. Your paper indicates that the four  
2 insects that you have referred to cyclical in nature.  
3 Could you describe the cycle of each of those insects,  
4 please?

5                   A. Yes, I believe I provided some  
6 graphs. Figure 5 -- excuse me, Figure 1, 2, 3 and 4.

7                   MR. FREIDIN: I think you'll find those  
8 on page 88 of the witness statement, Mr. Chairman.

9                   MR. CHURCHER: Following up on the  
10 comment by the Chairman, that these insects do have  
11 various cycles, but they are not always of the same  
12 duration or the same intensity and each insect tends to  
13 have its own specific cycle.

14                   Figure 1 talks about or describes in a  
15 graphical format the defoliation that we have seen by  
16 spruce budworm from the years 1936 to 1988 and overall,  
17 in that 52-year period, you can see two major cycles or  
18 epidemics. And, as you can see, as far as the province  
19 is concerned, province-wide, they seem to last a fair  
20 number of time. The first one began in '35 or '36 and  
21 somewhere in the province at any rate there was a fair  
22 degree of defoliation up until the -- or the early  
23 1960.

24                   Through the mid-60s there was very light  
25 defoliation but, as Mr. Armson pointed out, beginning

1 in 1967-68 we began to see the beginning of the next  
2 epidemic which -- and this most recent epidemic that we  
3 are still in the middle of, reached its peak in the  
4 late 70s, around 1980 when roughly 18-million hectares  
5 of the province suffered moderate to severe  
6 defoliation.

7 We are now in the downside of that, as I  
8 indicated, and we expecting to see the area of moderate  
9 to severe defoliation continue to decline over the next  
10 few years.

11 But as I also indicated, things are  
12 starting to happen once again -- once again in southern  
13 Ontario, so we may only have one or two years of the  
14 low numbers before we are into the next epidemic.

15 So the epidemics in the case of the  
16 spruce budworm last 20, 30 years across the province.  
17 In any one given area they usually only last five or  
18 six years, but when you look at the province as a  
19 whole, it takes longer than that for the insect to move  
20 across the province.

21 Figure 2 talks about the forest tent  
22 caterpillar. It has a very regular cyclical nature as  
23 you can see from that figure. Roughly every 10 to 12  
24 years we have an outbreak of forest tent caterpillar.  
25 It rises very quickly, it hits a peak which can be a

1 very high peak and also drops off very quickly. Again,  
2 across the province it may take five or six years for  
3 it to do all of this, but in any one given area it is  
4 only three to four years that it is a problem.

5 Figure 3 describes the nature of the jack  
6 pine budworm and, as you can see there, it doesn't have  
7 as regular cycles, it tends to come and go somewhat  
8 sporadically, it is very difficult to predict when or  
9 where it is going to crop up. And it tends to be very  
10 localized in its nature as to where the moderate to  
11 severe defoliation is going to be. Because of the type  
12 of tree that it feeds on or because of its host, the  
13 jack pine, it only tends to last two to three years in  
14 any one given area.

15 And the last figure, Figure 4 talks,  
16 about the gypsy moth which has only caused severe  
17 defoliation in Ontario since 1981. We haven't had  
18 enough time or enough experience with that insect in  
19 Ontario for it to establish a cycle, but what we did  
20 see when this insect was introduced to the province was  
21 a fairly rapid increase in the area of defoliation. It  
22 peaked in 1985 I believe and we had a rapid decrease  
23 and we are now -- in the last one to two years we've  
24 begun to see another increase.

25 This could very well be the beginning of

1 the next five-year cycle or six-year cycle but, as I  
2 say, since we haven't had much experience, it's hard to  
3 say exactly how that insect will operate in the  
4 province.

5 Q. Do I understand correctly then that  
6 the first three pests that you referred to are  
7 indigenous to Ontario?

8 A. That's correct. They are native  
9 pests that have been in the province for as long as  
10 records indicate, at least hundreds of years.

11 Q. And gypsy moth being...?

12 A. Gypsy moth is an introduced pest,  
13 originally came from Europe and was introduced into the  
14 United States in the 1860s, has worked its way  
15 throughout the northeastern United States into Quebec  
16 and more recently into Ontario.

17 The problem with introduced pests such as  
18 gypsy moth is they rarely introduce the natural  
19 mortality factors or diseases or parasites that keep  
20 the pest in check in its native lands in Europe,  
21 usually only the pest is introduced and not those  
22 control factors.

23 And so when it is introduced into a new  
24 environment, it takes off, expands very rapidly until  
25 some form of natural control can bring it back in

1 check.

2 The fourth message is that there are  
3 six -- actually six different general management  
4 techniques that can be used when dealing with insects.  
5 Use of insecticides is not the only management  
6 technique.

7 Those six techniques are regulatory  
8 control or legal control, in other words trying to  
9 limit the spread of the insect by applying quarantines  
10 and that type of thing is a good example; genetic  
11 reproductive control, growing insect resistant trees,  
12 for instance; mechanical or physical control methods in  
13 which case you would use some tool or implement to try  
14 and affect the insect, the use of a flyswatter, killing  
15 a fly is an excellent example of a mechanical or  
16 physical control, very physical.

17 THE CHAIRMAN: Have you ever tried  
18 swatting flies across all of Ontario?

19 MR. CHURCHER: That's why it is not a  
20 particularly practical control method on a provincial  
21 basis, but it works well in my kitchen.

22 The fourth method is classed as cultural  
23 control, and we could use the word cultural as being  
24 synonymous with silvicultural control in the case of  
25 forestry.

1                   And the fifth and sixth methods are  
2                   biological control, which includes the use of natural  
3                   mortality factors or biological agents such as natural  
4                   predators and parasites or natural diseases, such as  
5                   bacteria, specifically the bacteria bacillus  
6                   thuringiensis which has been marketed most recently as  
7                   a commercially available biological insecticide.

8                   Q.   Commonly referred to as BT?

9                   A.   Commonly referred to as BT, much  
10                  easier to pronounce. And the last type, as I  
11                  mentioned, was chemical control which relies on the use  
12                  of chemical insecticides.

13                  MR. FREIDIN: Now, Mr. Chairman, OFIA  
14                  asked an interrogatory. It is in Exhibit 632, OFIA No.  
15                  6. They asked for some indication of the extent to  
16                  which each of the control measures that Mr. Churcher  
17                  has referred to are used in the area of the undertaking  
18                  and have been used in the area of the undertaking over  
19                  the last five years.

20                  You will see that that undertaking -- the  
21                  answer to that undertaking attempts to address that,  
22                  but also provides a further description, a little bit  
23                  more of a detail of the description of the various  
24                  controls and perhaps it was just given by Mr. Churcher.

25                  Q.   Could you address the concern raised

1 in that interrogatory, Mr. Churcher, as to the  
2 proportion or the amount that each type of those  
3 controls is used?

4 MR. CHURCHER: A. Well, because many of  
5 these controls are -- especially some of the  
6 silvicultural controls are part and parcel of the  
7 normal silvicultural activities that are undertaken in  
8 forest management, we don't necessarily record them in  
9 a way that says we are doing this silvicultural  
10 treatment for insect control.

11 It may be used for another primary  
12 objective or primary purpose, but it also has the  
13 spinoff of being -- of controlling an insect population  
14 as well or preventing an insect population from causing  
15 damage. So it is not possible to quantify each of  
16 these control methods on a case-by-case basis.

17 However, the response to the  
18 interrogatory attempts to give some relative proportion  
19 as to how much each of these six methods is used.

20 Q. You indicated that cultural control  
21 could be interpreted as silvicultural control, and I  
22 understand that there are seven different silvicultural  
23 control techniques; is that correct?

24 A. Yes, I believe that's -- I list seven  
25 examples in the evidence on page 91 and 92. Again,

1 Forests for Tomorrow in Interrogatory No. 18 asked for  
2 a breakdown of the seven examples and how much each was  
3 applied. For the same reasons I have just provided in  
4 response to the OFIA interrogatory -- OFIA/OLMA  
5 interrogatory, the same reasoning applies to this  
6 interrogatory from Forests for Tomorrow.

7 But the seven examples that I gave were  
8 the selection of healthy seed and hearty stock; in  
9 other words, growing healthy trees. As I indicated for  
10 diseases, that's one of the best preventative measures  
11 for reducing the impact of insects and developing and  
12 growing and selecting healthy seed has been talked  
13 about in Panel 11 by Mr. Baker and the paper by Baker  
14 and Hood.

15 The second example I gave was using  
16 various site preparation techniques, including the use  
17 of prescribed burns to control insects or possibly to  
18 effect the regeneration that occurs after a harvest or  
19 after a prescribed burn to then reduce the effect of  
20 the insects and, of course, prescribed burns were also  
21 talked about in Panel 11.

22 The third example is probably what we  
23 think more of as silvicultural controls per se,  
24 regulating the rotation age, stand density or stand  
25 composition of the forest, and this is done throughout

1 the harvest and renewal and tending process and, as a  
2 result, has been talked about in Panels 10, Panel 11  
3 Panel 12 and will be talked about again in Panel 15.

4 In response to specific situations such  
5 as the European race of Scleroderris that I talked  
6 about before, you can conduct sanitation cuts to  
7 eliminate the affected stem or affected branches.

8 The fifth example of a cultural control  
9 that I provided was tending and fertilizing to increase  
10 plant figure. Fertilizing is not exactly a commonly  
11 practiced technique in Ontario, but many of the things  
12 that have been talked about already in this panel, as  
13 far as tending is concerned, have the benefit of  
14 growing healthier, more vigorous trees and that, of  
15 course, has the side benefit of making more  
16 insect-resistant or disease-resistant trees as well.

17 Cleaning a stand to reduce competition is  
18 the sixth example I gave and, of course, is an example  
19 of tending as well.

20 And the last example I provided in the  
21 evidence is adjusting the planting time or the  
22 harvesting time of the trees so that it is out of step  
23 or out of phase with the insect species at the time  
24 that the insect species will be there.

25 The best example of that occurred a few

1 years ago in Hearst District and Gogama District, I  
2 believe. There was a small outbreak of an insect known  
3 as the black army cutworm that seems to be active in  
4 the spring of the year and usually corresponds with the  
5 same time that trees are being planted. So these nice  
6 tender young seedlings were being planted in the ground  
7 and the black army cutworm were following the tree  
8 planters, almost eating the seedlings as soon as they  
9 were planted in the ground.

10 So the way to avoid that was just delay  
11 the planting of the seedlings by a few weeks or a  
12 month. The black army cutworm had done its thing and  
13 had eaten alternative vegetation such as fireweed and  
14 had pupated and moved on in its life cycle and was not  
15 the caterpillar stage anymore, therefore, it was not  
16 posing any threat to the seedlings when they were  
17 planted.

18 Q. Now, when action is taken to deal  
19 with insects, are you able to generalize or indicate  
20 whether certain types of control are used more  
21 frequently than others?

22 A. As far as forestry is concerned,  
23 probably the three techniques that are used most  
24 commonly are the silvicultural control techniques and  
25 the use of biological controls and chemical controls;

1 in other words, the use of biological and chemical  
2 insecticides. Those are the three predominant or major  
3 control techniques utilized.

4 Q. And I understand that chemical  
5 insecticides have not been used since 1984; is that  
6 correct?

7 A. The last time that chemical  
8 insecticides were aeriaily applied in this province for  
9 the use of control of forest insect pests was in 1984.

10 Q. I understand we will be getting into  
11 that a later little later?

12 A. Yes, we will.

13 Q. But if we could just deal with the  
14 other two control methods, the silvicultural technique  
15 and the biological. Which two techniques -- are those  
16 two techniques represented consistently across the area  
17 of the undertaking?

18 A. No, not necessarily. Depending on  
19 very specific factors, the silvicultural techniques may  
20 be adequate enough to treat the insect pest.

21 In other areas of the province, perhaps  
22 silvicultural techniques by themselves are not adequate  
23 to deal with the pest and so, therefore, it has to be  
24 supplemented with the use of biological insecticides or  
25 biological control as well.

1                   This is essentially what happened in the  
2 differences that arose between northeastern Ontario in  
3 the 1970s with respect to the spruce budworm  
4 infestation that was there. It was decided, due to  
5 local factors in the 70s, that they would not spray the  
6 spruce budworm in northeastern Ontario; whereas when  
7 the budworm became more of a problem in the 80s in  
8 northwestern Ontario, it was determined that  
9 insecticides were needed, as well as the silvicultural  
10 techniques, to deal with that particular outbreak. So  
11 it is a response to specific localized conditions.

12                   Q. Perhaps then we could move on to the  
13 fifth message, that some methods treat insects directly  
14 or in the short term while others are indirect and  
15 long-term control.

16                   Could you advise: Does proper insect  
17 management address long-term control?

18                   A. Yes. The best form of dealing with  
19 insect pests looks at both the short term as well as  
20 the long term, and to this end the Ministry has most  
21 recently developed a spruce budworm management strategy  
22 which is presented in the evidence as an example of a  
23 good overall strategy for dealing with an insect pest.

24                   It talks about what can be done to deal  
25 with budworm-susceptible forests, not only during an

1 epidemic, but also before an epidemic and afterwards  
2 and inbetween the epidemics in preparation for it.

3 So you are looking not only at the long  
4 term dealing with the forest so that it is less  
5 susceptible and less vulnerable to the insect when it  
6 is upon us, but when we are faced with the insect, what  
7 can be done specifically to treat that insect directly.

8 Q. Would the use of insecticides be an  
9 example of the short term?

10 A. That's correct, yes. Either  
11 biological or chemical insecticide would be a  
12 short-term technique directed specifically at the  
13 insect.

14 Q. Is there ever a mixture of sort of  
15 short-term and long-term action taken on the same  
16 stand?

17 A. Yes. Quite often you might have a  
18 short-term action, such as harvesting an area or  
19 salvaging an area that has been infested with spruce  
20 budworm as an example. Not only are you harvesting the  
21 area and using the wood before it dies as a result of  
22 the budworm outbreak, but you are also dealing with the  
23 insect in an indirect manner; you are taking its food  
24 supply away so, therefore -- in that specific area so,  
25 therefore, the insect will not return there in that

1 particular point in time.

2 But that would be best followed up by a  
3 more long-term approach of proper site preparation  
4 techniques to ensure that the balsam fir component of  
5 the stand or the forest does not return, the balsam fir  
6 being the preferred host of the budworm.

7 So following up your salvage harvest,  
8 your accelerated harvest with site preparation and then  
9 stand conversion to a less susceptible species would,  
10 in the long-term benefit -- or would provide long-term  
11 benefits because you have changed that forest, a highly  
12 vulnerable forest, to a forest of less vulnerable  
13 species.

14 Q. And when you carry out one of those  
15 conversions, are the species that are usually  
16 introduced into that stand area more commercially  
17 desirable than balsam fir?

18 A. In this particular example of spruce  
19 budworm in the balsam fir, yes, that would be the case.  
20 The less susceptible species that you might want or try  
21 to plant would be white spruce, which is a more  
22 commercially viable species than the balsam fir or, in  
23 some cases, jack pine which again is more commercially  
24 valuable than balsam fir.

25 So you not only have the benefit of

1 producing a less vulnerable forest but you are also  
2 producing a more commercially valuable forest as well.

3 Q. Is there any quantification of the  
4 use of the alternative techniques that you have  
5 identified?

6 A. Figure 5, which is found on page 121  
7 of Volume I of the evidence statement. This figure  
8 looks at the activities that occurred in 1987 in the  
9 northcentral region of Ontario. And the left-hand pie  
10 diagram -- the overall pie indicates the area of  
11 moderate to severe defoliation within the region which,  
12 in 1987, covered 5.3-million hectares.

13 Now, the portion -- the black piece of  
14 the pie has been expanded and those are the stands or  
15 the portion of the region which are classified as  
16 eligible stands or susceptible stands, stands that had  
17 a certain component of balsam fir and white spruce that  
18 were eligible for some treatment or other.

19 And we note that over the vast majority  
20 of that area, 81.4 per cent in fact, there was no  
21 treatment taken whatsoever. On roughly 15 per cent of  
22 that -- of those eligible stands, 88,000 hectares, in  
23 fact we conducted a spray program using the insecticide  
24 BT. This, I should note, was the proposed program. I  
25 believe actual spray figures were less -- somewhat less

1       than that, in the order of 79,000 hectares.

2                   MR. MARTEL: Could I ask a question? If  
3       that second pie comes from the larger pie, as it seems  
4       to, why would there be 586,000 hectares instead of  
5       5.3-million hectares?

6                   MR. CHURCHER: Okay. The 5.3-million  
7       hectare figure is taken directly from the maps that I  
8       had showed you before. And, as you noticed, there is a  
9       bit of broad brush in there that includes stands that  
10      showed moderate to severe defoliation because there was  
11      some component of balsam fir or white spruce in there  
12      that may have had some defoliation. It also includes  
13      small lakes and rivers and things like that.

14                   So what we look at, we take that large  
15      figure, we look at stand maps on a stand-by-stand basis  
16      and only pick out those stands that have at least 40  
17      per cent of the component being balsam fir, were balsam  
18      fir/white spruce combined.

19                   And that is why the actual eligible  
20      stands that you would consider conducting some kind of  
21      a treatment on is roughly 10 per cent of the overall  
22      area of moderate to severe defoliation mapped for the  
23      region.

24                   MR. FREIDIN: Mr. Martel, we will -- when  
25      we get into the spruce budworm policy or strategy, we

1 will be describing in a little bit more detail the  
2 criteria by which areas which are being affected by  
3 insects actually become eligible for protection.

4 MR. CHURCHER: So to continue on then  
5 with the pie on the right-hand side, 81.4 per cent was  
6 not treated, 15 per cent was sprayed with BT, 3 per  
7 cent, or roughly 17.5-thousand hectares of those  
8 eligible stands had already been scheduled for harvest  
9 in that particular year and were actually cut.

10 And on a further 3.5-thousand hectares  
11 there was some salvage harvesting conducted to utilize  
12 the balsam fir and white spruce components of the.  
13 forest before they -- while they were still viable and  
14 valuable.

15 MR. FREIDIN: Q. Mr. Churcher, could you  
16 turn to page 132 of the witness statement, please.  
17 That's where we find the first page of the Spruce  
18 Budworm Management Strategy for Ontario; is that  
19 correct?

20 MR. CHURCHER: A. That's correct.

21 Q. Am I correct that the executive  
22 summary ends at the bottom of page 132?

23 A. That is also correct.

24 Q. And so that the actual strategy then  
25 is what follows on page 133 through to 140?

1 A. That's right.

2 MR. FREIDIN: There was some confusion  
3 about where that summary ended, Mr. Chairman, so I  
4 thought I would just point out that.

5 Q. When was this strategy developed, Mr.  
6 Churcher, and what is its present status?

7 MR. CHURCHER: A. The strategy was  
8 developed beginning in June of 1987 and over a two-year  
9 period until -- or one and a half year period until  
10 January, 1989 went through a number of different drafts  
11 and reviews.

12 What happened in June of 1987 was a  
13 workshop was held in Thunder Bay, there were 20  
14 participants invited to this workshop representing  
15 various aspects of the Ministry of Natural Resources,  
16 as well as representatives from Ministry of  
17 Environment, representatives from the -- providing the  
18 perspective of environmental groups, representatives  
19 from the Ontario forest industry, a representative from  
20 another jurisdiction to provide an alternative approach  
21 or outlook to dealing with spruce budworm, as well as  
22 representatives from universities in Ontario and  
23 researchers from Ministry of Natural Resources and the  
24 Canadian Forestry Service.

25 And what those 20 people did was share

1 their ideas and their views as to how -- various  
2 techniques and ways that spruce budworm could be  
3 managed. And after two days the outcome of the  
4 workshop was then developed into the strategy that you  
5 see before you running from pages 132 to 140.

6 It was interesting to note that of those  
7 20 participants from various backgrounds and looking at  
8 it from various perspectives, at the end of two days  
9 there was a high degree of consensus between the 20  
10 people as to how spruce budworm could and should be  
11 managed in Ontario.

12 So then in the following 18 months or so  
13 the strategy went through a number of different drafts  
14 and was reviewed by field staff, by the workshop  
15 participants themselves, by the forest industry and in  
16 January of 1989 was approved by the Forest Resources  
17 Group of the Ministry of Natural Resources and  
18 distributed to the field to be used by field staff as a  
19 planning tool or a set of guidelines that they should  
20 consider and use when formulating their timber  
21 management plans for the next five years.

22 It highlights a number of areas and  
23 points that they should keep in mind when dealing with  
24 a forest that is susceptible to spruce budworm.

25 THE CHAIRMAN: Is the application of

1       these mandatory?

2                   MR. CHURCHER:  It is -- one of the points  
3       that is in the strategy is that there must be in each  
4       timber management plan reference to the spruce budworm  
5       strategy, and that a spruce budworm strategy has been  
6       thought of and implemented.

7                   I shouldn't say that -- not in each and  
8       every timber management plan, obviously it would be in  
9       the timber management plans that contain forests or  
10      contain stands that would be susceptible to spruce  
11      budworm.

12                  If the timber management plan -- or if  
13      the unit for which the plan is applying is a hundred  
14      per cent jack pine, then obviously it is not necessary  
15      to have a spruce budworm management strategy included  
16      in that plan.

17                  MR. FREIDIN:  Q.  And I understand that  
18      the Ministry of the Environment asked how many approved  
19      timber management plans are in place for forest  
20      management units within the area of the undertaking  
21      and, of those, how many contain a spruce budworm  
22      control strategy.  And what's the answer to that  
23      question?

24                  MR. CHURCHER:  A.  I believe the response  
25      was that as of April 1st, 1989 there were 38 or 39

1 approved timber management plans in place. However, it  
2 was not fair to assume -- since the strategy was only  
3 distributed in January of 1989, it was not fair to  
4 assume that any or all of those timber management plans  
5 would indeed have a reference to the spruce budworm  
6 strategy. And that of course, as I mentioned before,  
7 some of those plans -- the spruce budworm strategy  
8 might not have been applicable to some of those plans  
9 because they did not have stands susceptible to spruce  
10 budworm to deal with.

11 However, I believe we also indicated in  
12 our response that many timber management plans, not  
13 only using the current TMP planning process, but in  
14 previous timber management plans prior to that, have  
15 had components of the plan in there that address the  
16 spruce budworm. Because of the spruce budworm we are  
17 planning on harvesting the stand and we are going to  
18 convert it to non-susceptible species, although it  
19 didn't specifically reference the spruce budworm  
20 strategy.

21 MR. FREIDIN: And, Mr. Chairman, you will  
22 see in Panel 15 in the the Red Lake Management Plan  
23 which I think was prepared in 1986 - anyway it was  
24 before the strategy - there is in fact a portion which  
25 addresses the concern in that particular management

1 unit regarding spruce budworm.

2 THE CHAIRMAN: Okay. Mr. Churcher, is  
3 the Board to assume that in every unit which contains  
4 host trees which might be affected by spruce budworm,  
5 that the plans approved must contain reference to this  
6 strategy, whether or not specific action has been taken  
7 under the strategy, but at least reference that: Yes,  
8 we have considered it and here is or is not the action  
9 taken.

10 MR. CHURCHER: Yes, that is correct.

11 THE CHAIRMAN: It is mandatory in that  
12 sense, you must look at it and take whatever action may  
13 be within your discretion provided that you have  
14 considered the strategy in those areas where you have  
15 host trees to which the strategy will be applicable?

16 MR. CHURCHER: Yes, that's correct. And,  
17 in fact, that very point is addressed on page 137. To  
18 ensure that the strategy was being talked about, under  
19 the heading Forest Resources Group, the very first  
20 point there states:

21 "The spruce budworm management strategy  
22 must be made a requirement for all timber  
23 management plans for Crown land where the  
24 budworm is or may become a problem. A  
25 similar strategy must be addressed in

1                   each provincial park plan as well."

2                   MR. FREIDIN: Q. Now, does the strategy  
3 deal with the various control methods that you have  
4 referred to, or does it deal only with one such as use  
5 of pesticides?

6                   MR. CHURCHER: A. No. As I indicated,  
7 it is a good example of a strategy that deals not only  
8 with the short-term management techniques but also  
9 longer term techniques. Its major purpose was to talk  
10 about the various things that can be done between  
11 epidemics, not just what can be done during the  
12 epidemics.

13                   This was one of the reasons why it was  
14 felt that we needed -- the Ministry needed a strategy  
15 such as this. Though we already had a number of  
16 policies and procedures and rationals and manuals that  
17 dealt with the use of insecticides and how to spray  
18 spruce budworm or other insect pests, but there was not  
19 particularly a document that talked about all of the  
20 different management techniques that are available and  
21 to amalgamate them, integrate them altogether in one  
22 document and that was what the strategy attempts to do.

23                   Q. Mr. Churcher, I understand that there  
24 are three stages of an insect infestation and that the  
25 Ministry responds to each of them in a different way;

1 is that correct?

2 A. That's correct.

3 Q. Can you explain the three different  
4 stages of an insect infestation and how they are  
5 addressed?

6 A. A classic insect outbreak begins as a  
7 small discreet area such as the small area Mr. Armson  
8 was pointing out in his maps in 1967. These areas are  
9 sometimes referred to as epicentres and, in that case,  
10 it is wise to -- or it may be wise, given certain  
11 situations, proper circumstances to try and suppress  
12 the populations in those small discreet areas, the key  
13 word being suppression.

14 And to do that then, you would treat that  
15 entire area either by harvesting it, if it is small  
16 enough and removing the pest species as well as the  
17 host, of course, the host trees; or if it is a little  
18 bit larger or harvesting isn't going to be effective or  
19 it's not possible to move the harvesting equipment in  
20 and conduct it, then to spray that area with an  
21 insecticide.

22 This technique has been used only twice  
23 in the history of Ontario that I am aware of. The  
24 first time was in 1968 located west of Thunder Bay near  
25 Burtrell Lake and that was one of the areas where it

1 was noted that spruce budworm was building up and it  
2 first noticed in 1967 in actual fact, and so the  
3 following summer in 1968 they tried to suppress that  
4 small area by conducting a spray program.

5 The second example is, as I indicated  
6 when I was talking about the jack pine budworm, I had  
7 the overhead, the second example would be conducted  
8 this year, 1989, to try and suppress those two discreet  
9 areas of defoliation that we noticed last summer before  
10 they spread throughout the large mature stands of jack  
11 pine to the north of those areas.

12 Q. That's the two areas in Thunder Bay  
13 District?

14 A. That's correct, just east of English  
15 River, the Town of English River.

16 The second phase or stage of an outbreak  
17 is when it begins to expand beyond the small discreet  
18 epicentres, if you will, it's too charged an area to  
19 try to suppress or suppress the insect population,  
20 however, it may still be reasonable to try to contain  
21 the spread of the insect so that it doesn't expand  
22 beyond it's current boundaries.

23 Again, this is normally done through the  
24 use of insecticides because we are talking about a  
25 larger area and it would be difficult to try and

1 harvest all of those areas.

2 An example where that was conducted was  
3 throughout the early 1970s, again in the northcentral  
4 region, northwestern Ontario. As other areas  
5 throughout the northwest increased and the beginning of  
6 the outbreak that occurred in the late 1960s began to  
7 expand, it was attempted to try and contain the spread  
8 of the spruce budworm.

9 And that containment operation continued  
10 until 1976, at which point the outbreak had expanded  
11 beyond the point where it was feasible to try to  
12 contain it anymore and the containment operation ended.  
13 The outbreak was then allowed to expanded unabated in  
14 northwestern Ontario and what we see on the map in 1988  
15 is the result of that.

16 Which then leads us to the third stage of  
17 an insect outbreak and that is the outbreak itself when  
18 it reaches epidemic proportion, it covers large areas  
19 of the province and at that point it is common just  
20 to -- it is common in Ontario just to pinpoint specific  
21 areas for specific values that you want to protect and  
22 concentrate your efforts on those and, over the vast  
23 majority of the area, to allow the epidemic to continue  
24 unabated, allow it to progress through its natural  
25 course of events and to allow mortality factors to

1 bring the outbreak to an end.

2 Your example, Mr. Chairman, of the Dutch  
3 elm disease is a good example of that. Specific cities  
4 or in specific parks -- or some cities and parks pick  
5 specific trees that they wanted to protect from Dutch  
6 elm disease and so they took the precautions of  
7 treating those trees with the fungicide.

8 Cities such as Fredericton and Winnipeg  
9 have been very successful in doing that, but it's not  
10 possible to do that in very farm field across southern  
11 Ontario.

12 Q. Mr. Churcher, you have described  
13 three methods of control. You have talked about  
14 suppression of a burgeoning outbreak, you have talked  
15 about suppression or containment of an outbreak, and  
16 you have talked about protection of foliage, I think?

17 A. Yes. That would be then the major  
18 objective. In the first two instances, the suppression  
19 of a small outbreak and the containment of an expanding  
20 outbreak, your objective is essentially to kill insects  
21 so that they do not spread; whereas when you get to the  
22 third point, when it is an epicentre or -- I'm sorry,  
23 when it is an epidemic, the objective is more to just  
24 protect the foliage of those key trees or those key  
25 areas that you were trying to protect so that they can

1       withstand the feeding of the insect.

2                       Now, of course the best way to protect  
3       the foliage is to make the insect stop feeding and the  
4       best way to make the insect stop feeding is to kill the  
5       insect, but you measure your success in terms of the  
6       foliage that you have protected, how many green needles  
7       or green leaves remain on the tree as opposed to how  
8       many dead insects you find.

9                       MR. FREIDIN: Mr. Chairman, we will be  
10       going through a table which actually reports results of  
11       an application of insecticide.

12                      Q. Could you just indicate why the  
13       suppression control method, which is the first one, has  
14       been used only twice since 1968?

15                      MR. CHURCHER: A. As I indicated, it's  
16       only applicable in certain circumstances, under certain  
17       conditions and those conditions would be when you first  
18       note that small area, you have to conduct the operation  
19       as soon as possible so that it hasn't already begun to  
20       spread, so the epicentre or the small area is as small  
21       as possible.

22                      And also when it's in a reasonable amount  
23       of isolation, it's all by itself and it's not going to  
24       be affected by other outbreaks that are occurring all  
25       around it. And it also of course - if you are going to

1 be using insecticides - has to be in an area where you  
2 can treat the insecticides -- or can treat it with  
3 insecticides and you are not leaving some portion of  
4 it -- of this outbreak untreated through the  
5 application of buffer zones for instance, or for  
6 whatever reason.

7                   There is no point in treating 95 per cent  
8 of it but leaving 5 per cent of it untreated because  
9 you are having no effect on the eventual outcome there,  
10 you are still leaving this population of insects behind  
11 untreated.

12                   So in those conditions it's a viable  
13 option. As I indicated, those conditions and  
14 circumstances are rare and for that reason we are doing  
15 it this year, we did it roughly 20 years ago.

16                   Q. Now, the Ministry of the Environment  
17 in their Interrogatory No. 8 asked for the last five  
18 years, what percentage of the insecticide applications  
19 within the area of the undertaking were undertaken for  
20 each of the three control purposes. And your response  
21 was?

22                   A. The response to that interrogatory  
23 was that, because each of these insects that we were  
24 dealing with were in the outbreak or epidemic phase,  
25 then the objective was simply foliage protection. We

1 were not trying to suppress populations or contain  
2 populations, we were protecting the foliage on specific  
3 values.

4 Q. Now, there are a number of documents  
5 in the witness statement, Mr. Churcher, which contain  
6 similar and, in some cases, identical information and I  
7 would just like to take a moment and perhaps have you  
8 clarify where each of those documents fit into the  
9 total picture.

10 MR. FREIDIN: And the documents I'm  
11 referring to, Mr. Chairman, are as follows, there is  
12 five of them:

13 There is the 1980 Policy for Aerial  
14 Application of Insecticides for Forest Management in  
15 Ontario, pages 173 to 174; there is the Rationale for  
16 Spruce Budworm Spraying Present and Future, it's a 1979  
17 document which appears on pages 141 to 146.

18 You have another document, it's Policy  
19 for -- it's actually the same as the first one, doesn't  
20 have the word 1980 in front of it, so it's Policy for  
21 Aerial Application of Insecticides for Forest  
22 Management in Ontario but it's dated November the 11th,  
23 1985, and you will find that at page 147 and 148; and  
24 the fourth document is the procedure related to that,  
25 so it's the Procedure for Aerial Application of

1 Insecticides for Forest Management in Ontario and it's  
2 dated April the 1st, 1987, found at pages 149 to 167.

3 And the fifth is the Spruce Budworm  
4 Management Strategy for Ontario which, as Mr. Churcher  
5 indicated, was approved and released to the field on  
6 January the 25th, 1989 and you find that at page 132 to  
7 138.

8 And I had some confusion, Mr. Chairman.  
9 When I went through the material trying to figure out  
10 where these all fitted in.

11 Q. And perhaps, Mr. Churcher, you could  
12 provide the Board with the same assistance you provided  
13 me?

14 MR. CHURCHER: A. Those five documents  
15 represent the evolution, if you will, of insect  
16 management in Ontario beginning in 1979 with the  
17 document Rationale for Spruce Budworm Spraying, Present  
18 and Future.

19 Which, as Mr. Freidin indicated, is on  
20 pages 141 to 146 and it discusses, as the title  
21 indicates, the when and the whys and the wheres and the  
22 hows of spraying spruce budworm in Ontario. And it  
23 talks about the three levels of protection that I have  
24 just talked about, the epicentre suppression and the  
25 containment, foliage protection, and indicates on what

1 areas spraying should be conducted or could be  
2 conducted.

3 The next stage or next step would be the  
4 policy, 1980 Policy for Aerial Application of  
5 Insecticides for Forest Management in Ontario, page 173  
6 to 174. And, to my knowledge, that is the first  
7 version of that policy and the first time that it was  
8 written down in a policy statement that it would be the  
9 policy of the Ministry of Natural Resources to use,  
10 whenever possible, biological insecticides in  
11 preference to chemical insecticides.

12 Whenever possible is defined as being  
13 those times when the biological is federally registered  
14 and provincially scheduled, when it's commercially  
15 available, and when the biological would be as cost  
16 effective as the chemical alternative.

17 MR. FREIDIN: Mr. Chairman, you will find  
18 that provision of the policy, if you turn to page 148  
19 of the 1985 policy.

20 Page 148, the first full paragraph you  
21 will find the text of the policy which in fact deals  
22 with what Mr. Churcher just referred to in his  
23 evidence.

24 MS. CRONK: I'm sorry, Mr. Chairman.  
25 Could Mr. Freidin clarify that. I understood the

1 witness to mention the 1980 policy, I understood Mr.  
2 Freidin to mention 1985.

3 MR. FREIDIN: All right. I'm sorry, I  
4 heard 19 -- I thought he said 1985.

5 MR. CHURCHER: Perhaps I can clarify that  
6 Ms. Cronk. I was talking of 1980 policy. And the  
7 indication was that that was the first time that this  
8 policy -- or was written down, the policy of the  
9 Ministry that we would use biological insecticides in  
10 preference to chemicals whenever possible.

11 The next document I was going to speak to  
12 is the one which Mr. Freidin was talking about, is the  
13 1985 policy.

14 MR. FREIDIN: And, Mr. Chairman, the 1980  
15 policy, page 174, in the first full paragraph has that  
16 policy described by Mr. Churcher.

17 MR. CHURCHER: There is in fact very  
18 little difference between the '80 policy and the '85  
19 policy. I provided the 1980 policy as a matter of a  
20 historical document.

21 The 1985 policy is almost word for word  
22 the same, but it is the current policy of the Ministry  
23 of Natural Resources and that is why I provided the '85  
24 document as well. Does that clarify the confusion?

25 The fourth document that Mr. Freidin

1 mentioned was the Procedure for Aerial Application of  
2 Insecticides for Forest Management in Ontario dated  
3 April 1st, 1987 and that is a copy of the most current  
4 procedure of how to conduct aerial spray programs for  
5 forest insects. And it goes into more details of  
6 exactly how you go about selecting areas, which areas  
7 would be eligible for treatment, and how to conduct the  
8 treatment.

9 Mr. Nicholson and Mr. Iskra will talk  
10 about some more of the details of that procedure in  
11 tomorrow's evidence.

12 And the fifth document then is the final  
13 step in the evolution, and that is the specific  
14 Strategy for Spruce Budworm Management in Ontario,  
15 dated January, 1989.

16 There is nothing in there that disagrees  
17 with any of the previous documents. The criteria that  
18 are used in the procedure have been also included in  
19 the strategy for spruce budworm. They may have been  
20 interpreted --they may be in a slightly different  
21 format, or in a different order, but they have been  
22 interpreted from the more general: This is how we deal  
23 with forest insects in general, to a specific: This is  
24 how we will deal with spruce budworm in particular.

25 And it's important to note that the

1 strategy, and as I think I indicated before, is a  
2 guideline, it's a planning tool. There is nothing cast  
3 in stone within it. There are figures and numbers  
4 presented at various points in the strategy, but they  
5 are not necessarily there to be followed rigidly, they  
6 are there to provide a guideline to the forester.

7 MR. FREIDIN: Mr. Chairman, I think that  
8 would be a convenient time for a break and I would ask  
9 that you make it short, this is going much more slowly  
10 than I had anticipated.

11 I still think we can finish today, but I  
12 think we are going to go past four 4:30 -- past four  
13 o'clock, well past four o'clock.

14 THE CHAIRMAN: Okay. We will take 10  
15 minutes.

16 MR. FREIDIN: Fine. Thank you.

17 ---Recess taken at 2:55 p.m.

18 ---On resuming at 3:20 p.m.

19 THE CHAIRMAN: Thanks. Be seated,  
20 please.

21 MR. FREIDIN: Q. Mr. Churcher, does the  
22 budworm strategy supplant or replace the policy or the  
23 Procedure for the Aerial Application of Insecticides for  
24 Forest Management in Ontario?

25 MR. CHURCHER: A. Not at all, no. It

1 interprets -- as I indicated, interprets some of the  
2 points in the policy and the procedure, but it  
3 certainly does not supersede the policy and the  
4 procedure. The policy dated 1985 is still current, the  
5 procedure dated April 1st, 1987 is still the current  
6 procedure.

7 Q. When you are into the third control,  
8 foliage protection, is emphasis given to any particular  
9 part of the forest?

10 A. Yes. In the procedure which appears  
11 on page -- beginning on page 149 of the statement of  
12 evidence, and actually on page 150, it talks about the  
13 protection of the foliage during the epidemic phase.  
14 And the procedure defines two distinct categories -- or  
15 two distinct types of forests that can be protected in  
16 that situation. The first is called the commercially  
17 operable forest and the second is defined as high value  
18 forest.

19 Q. And commercially...?

20 A. And that is found on pages 150, 151  
21 and 152 of the statement of evidence.

22 Q. Could you define then for the Board,  
23 or describe for the Board what a commercially operable  
24 forest is which qualifies for protection?

25 A. The commercially operable forest has

1       been defined as one that is going to be cut or  
2       harvested within the next ten years. And the procedure  
3       goes on to state that this forest must also have a  
4       certain stand composition - which is the 40 per cent  
5       figure which I talked about before - 40 per cent of the  
6       stand has to be of the susceptible, major commercial  
7       species.

8                       And, as Mr. Martel pointed out in his  
9       question about the Figure 5, the two pie charts, this  
10      is where -- the application of this procedure is where  
11      we go from the gross 5.3-million hectare figure down to  
12      the 535,000 or 550,000 hectare figure by applying the  
13      various qualifiers that appear in the procedure.

14                     Q. OFIA/OLMA asked for the basis and the  
15      rationale for the time period of ten years which you've  
16      mentioned. And did the MNR respond to that  
17      interrogatory?

18                     A. Yes, we did.

19                     MR. FREIDIN: And, Mr. Chairman, you will  
20      find the answer is contained in Interrogatory 7, sub  
21      (h).

22                     Q. Perhaps you could explain the answer  
23      which was provided, Mr. Churcher?

24                     MR. CHURCHER: A. The ten-year figure  
25      was selected because it -- in the forest insect pests

1 that we have in Ontario, there are none that I am aware  
2 of that last any longer than five or six or seven  
3 years, or eight years actually perhaps in any one given  
4 area.

5 The spruce budworm is the insect that I  
6 am thinking of most specifically here and, in some  
7 situations, it will last in one area for six or seven  
8 years, but it does not last longer than ten years in  
9 any one given area. So, therefore, the epidemic will  
10 have come -- done the damage it's going to do to the  
11 trees and then will have collapsed within that ten-year  
12 period. So the ten years was selected as an  
13 interpretation of the entomological cycle of the  
14 insect.

15 In addition, the ten years was selected  
16 so that there would be a certain limitation on the area  
17 that would be sprayed in any given year or at any given  
18 time. We did not want to attempt to spray the entire  
19 outbreak and get into a situation that other provinces  
20 have found themselves in.

21 Q. All right. Perhaps we could come  
22 back to that in a moment. If we look at the  
23 interrogatory, the interrogatory asked -- did deal or  
24 ask about the ten years, but it referred to the spruce  
25 budworm strategy, section 4.9.3.

1                   And can you advise me whether, in terms  
2                   of the ten-year period, there is any substantial  
3                   difference between the budworm strategy and the  
4                   procedure, section 3.1 that you referred to?

5                   A. No, essentially there is no  
6                   difference. The intent of both of those sections, the  
7                   one that appears in the strategy and the one that  
8                   appears in the procedure, the intent is essentially the  
9                   same. The wording may be different, but the basic  
10                  message is the same there.

11                  Q. Well, what happens, Mr. Churcher, if  
12                  a company believes that more than its next ten years'  
13                  supply needs protection; can the protection be extended  
14                  beyond the ten-year period, for instance?

15                  A. In that case there is an opportunity  
16                  to spray beyond that ten-year period and, in that case,  
17                  the forest would be valued -- or would be termed a high  
18                  value forest and that is explained more fully on page  
19                  151 of the evidence. The procedure talks about high  
20                  value forest. The first category in that high value  
21                  forest is investment or management value and --

22                  Q. And you are referring now to section  
23                  3.2 of the procedure on the page 151?

24                  A. That's correct. And the third point  
25                  in that category 1 says -- and I will quote from the

1 procedure. It says that we can spray certain areas,  
2 and it's a quote:

3 "Stands identified as essential to  
4 sustaining long-term approved annual  
5 allowable cut. In the case of long-term  
6 licensees or FMA areas, the  
7 identification will be the responsibility  
8 of the licensee or agreement holder."

9 And so that allows for the spraying of  
10 stands that would not normally be cut within ten years  
11 but are going to be required some time between that ten  
12 year -- between the ten-year period or after that-ten  
13 year period.

14 Q. Can you give me an example of where  
15 that provision might give rise to a request?

16 A. Well, in the jack pine budworm  
17 outbreak that occurred in the northeastern part of the  
18 province in 1985 and '86, the concern on the part of  
19 the company was not so much the impact that the budworm  
20 was going to have on their harvest area over the next  
21 immediate ten-year period, a lot of their concern was  
22 the effect that the insect epidemic was going to have  
23 on the current growing stock, those trees that they  
24 were going to rely upon 20 or 30 years down the road.

25 And so, in that case, the company was

1       able to make a case and convince the Ministry that we  
2       should invoke that section of the procedure and that we  
3       did indeed in fact spray trees that were going to be  
4       harvested not within the ten-year period but, in  
5       effect, 20 or 30 years down the road.

6                       Sometimes -- that doesn't always happen.  
7       In 1988, and I believe in 1989 in Thunder Bay, talking  
8       about the spruce budworm, the company was interested in  
9       spraying some stands that were not going to be  
10      harvested within the ten-year period, the Ministry felt  
11      that there were other stands that were available that  
12      the company could use 15 or 20 years down the line, if  
13      indeed the stands that the company was worried about  
14      had been damaged so severely by the budworm during the  
15      epidemic that they were not commercially viable or were  
16      not merchantable, that there were other stands that had  
17      not been or were not going to be affected by the  
18      budworm at that time that the company could use.

19                      So, in that case, the Ministry decided  
20      not to spray those stands.

21                      MR. MARTEL: Could the company have  
22      sprayed on its own, if it wanted to, without getting  
23      the assistance from the government?

24                      MR. CHURCHER: No. Under the FMA --

25                      MR. MARTEL: They can't.

1 MR. CHURCHER: They can't. The  
2 responsibility for spraying insects lies with the  
3 Ministry of Natural Resources.

4 Now, in the case of a company such as  
5 Abitibi-Price which has some freehold or owns some land  
6 themselves, then they can and, in fact they have  
7 sprayed their own property, their own forest I believe  
8 in 1986 or 1987. I can't recall exactly which year  
9 Abitibi-Price did spray their own freehold forest for  
10 spruce budworm.

11 But if it's Crown land, whether it's  
12 under an FMA or not under an FMA, the responsibility is  
13 with the Ministry of Natural Resources for treatment.

14 MR. MARTEL: The question I'm asking is:  
15 The responsibility rests with the Crown, but should a  
16 company choose -- want - let's put it that way - want  
17 to spray and offer to do it under supervision and pay  
18 for it by themselves, would the Crown allow that to be  
19 done?

20 MR. CHURCHER: I'm not aware of that ever  
21 occurring and if it did occur, I don't think it would  
22 be allowed, no.

23 THE CHAIRMAN: What is the worry, the  
24 cost or the supervision, the safety?

25 MR. CHURCHER: Well, the reason that it

1 has been included in the FMA that it is the  
2 responsibility of the Crown to do that is that insects,  
3 unlike weeds or diseases, tend to be very transient in  
4 nature. Obviously they don't respect FMA boundaries or  
5 district boundaries or international boundaries.

6 And so to provide some form of consistent  
7 approach and some form of consistency provincially, the  
8 responsibility was left with the Ministry.

9 THE CHAIRMAN: Yes. But wouldn't it -- I  
10 mean, in so many areas the Ministry has so much money  
11 to throw around for various programs, and would you not  
12 run into the possibility of the Ministry saying: Look,  
13 there's -- the infestation is so wide spread that we  
14 have to concentrate on certain areas, we really can't  
15 deal with your area because there is others in worse  
16 shape and you are going to have to make some choices  
17 and some allocations.

18 In that case could the company come back  
19 and say: We understand that there is worse case  
20 scenarios, but we are willing to pay for this because  
21 we want to make sure that our future growing stock is  
22 protected. And you are going to come back at us with  
23 some kind of budgetary argument and we are saying we  
24 will take that out of your hands.

25 I think that was part of Mr. Martel's

1 question as well.

2 MR. CHURCHER: Well, in actual fact  
3 something very similar to that did happen in 1986, I  
4 believe, '86 spray season and that there were a number  
5 of areas that -- excuse me, a number of areas that were  
6 eligible to be treated, the companies were interested  
7 in having treated, however, there was not enough money  
8 essentially to treat the entire areas. And so the  
9 Ministry said: We are going to pick -- the companies  
10 were asked in association with the Ministry to prioritize  
11 exactly which areas would be treated or needed  
12 treatment the most and we treated the areas that were  
13 the highest priority.

14 The company did suggest that this could  
15 be a possibility, that if the Ministry didn't have the  
16 money that the industry could find the money to do it  
17 and the offer was not accepted by -- on the part of the  
18 Ministry. The company did not pursue it or the  
19 companies did not pursue it.

20 THE CHAIRMAN: Thank you.

21 MR. CHURCHER: Now that I think of it, I  
22 do recall an example and that did occur.

23 MR. FREIDIN: Q. Mr. Churcher, can you  
24 advise me whether in the forest eco-system bugs are a  
25 bad thing?

1                   A. No, not at all. As we indicated,  
2 most of the insects we are talking about, the two  
3 budworms as well as the forest tent caterpillar, they  
4 are a natural part of the forest eco-system and they  
5 are there for a purpose.

6                   They have as much of a role in the forest  
7 and the evolution and succession of the forest as the  
8 moose and the deer and the squirrels and anything else.

9                   The spruce budworm, for instance, tends  
10 to affect and attack -- large stands of overmature  
11 balsam fir tends to be its preferred host and to those  
12 conditions where it builds up and you can look at  
13 spruce budworm as essentially the means in which Mother  
14 Nature cleans out her closet.

15                  And she gets rid of the old, overmature  
16 balsam fir by sending in a spruce budworm epidemic  
17 which kills vast majorities of this area allowing the  
18 younger regenerating shade tolerant balsam fir to -- or  
19 the younger regenerating balsam fir that's in the  
20 understorey to come up.

21                  So you get rid of this old decadent,  
22 decaying forest and are replacing it with a young,  
23 vigorous, vibrant forest. The same is true for jack  
24 pine budworm and forest tent caterpillar as well has a  
25 role to play.

1 Q. Did you indicate in your answer a few  
2 moments ago that you thought of an example where there  
3 was a request of some sort by industry to undertake  
4 insect control work on their own?

5 A. I don't recall it being necessarily a  
6 request, it was more in the form of an offer, that if  
7 the Ministry of Natural Resources did not have the  
8 funds to conduct the spray program, that the forest  
9 industry might be able to provide services or to  
10 provide money to do it themselves.

11 And, in actual fact, in the '86 program  
12 and in the '85 spray program as well, they did offer  
13 and have offered use of their camps to house our crews  
14 and use of airstrips that they may have set up for  
15 herbicide programs that we have been able to use.

16 MR. MARTEL: Was one of the reasons for  
17 that not proceeding though a difference of opinion as  
18 to whether chemical should be used or in fact BT should  
19 be used and that was the reason the Ministry declined  
20 the offer?

21 MR. CHURCHER: At the time the offer was  
22 made there was no decision or a decision had not been  
23 made as to whether we were going to use chemicals or  
24 biological insecticides.

25 However, I do recall that there was that

1 component in the conversation or in the offer, that if  
2 the Ministry is not going to be allowed to use BT then  
3 we the companies perhaps could go ahead and use  
4 chemicals if we conduct our own spray programs on Crown  
5 land.

6 And I believe the response to that  
7 conversation or to that offer was, no, a decision  
8 that's going to be made as to what is going to be used  
9 on forests on Crown land, it doesn't matter who is  
10 going to apply it, the decision is going to be  
11 affecting all forests on all Crown land.

12 MR. MARTEL: But the reason for the  
13 withdrawal, I guess what I am trying to get at, was it  
14 because there was this difference of opinion and the  
15 Ministry was trying to formulate a policy, as I  
16 understand it at that time, which was moving towards BT  
17 and less use of chemicals as opposed to some people  
18 still wanting to use primarily chemicals, and is that  
19 the reason why it didn't change?

20 Let's say the offer was: Well, let's use  
21 BT jointly across the province. Would the Ministry  
22 have said yes then to that proposal, as opposed to a  
23 difference of opinion on what should be used?

24 MR. CHURCHER: No, I think the choice --  
25 the decision as to who was going to conduct the

1       spraying would have been the same or the offer would  
2       have still have been declined.

3                       And again, the major reason, as I  
4       recall - we are going back a few years now - but as I  
5       recall, the major reason was that the Ministry was  
6       interested in applying a consistent province-wide  
7       approach to dealing with these insect pests and they  
8       felt that, money constraints aside, that only those key  
9       areas should be treated and that it was not necessary  
10      to treat as many areas as were originally proposed,  
11      that we could treat only those high priority areas as  
12      had been prioritized by the company and by the  
13      Ministry.

14                     It was a large wish list, if you will,  
15      and in order of priority.

16                     MR. FREIDIN:  Q.  Did the -- does the  
17      answer that you gave about the bugs being part of the  
18      eco-system have any role to play or application to the  
19      decision that you referred to?

20                     MR. CHURCHER:  A.  Well, there again, one  
21      of the reasons why it was decided to only spray a small  
22      portion of the epidemic, relatively small portion of  
23      the epidemic, and why the Ministry did not want to  
24      start to get into larger spray programs is because the  
25      insects do play a major portion in the eco-system and

1 it was felt that it would be more appropriate to allow  
2 the epidemic to run its natural course than to try to  
3 interrupt that outbreak. Let Mother Nature bring it to  
4 an end on her own as she has in the past and she always  
5 will when she is allowed to do it on her own.

6 Q. Mr. Churcher, Forests for Tomorrow  
7 asked an interrogatory, Interrogatory No. 21, they  
8 wanted to know, amongst other things, the cost of the  
9 1987 aerial spray program and the estimated value of  
10 the timber which was saved.

11 Were you able to provide an answer to  
12 that?

13 A. Yes, we were. We provided a number  
14 of different facts and figures in response to that  
15 interrogatory. It is Interrogatory No. 21, I believe.

16 MR. FREIDIN: That's part of the Exhibit  
17 632, Mr. Chairman.

18 MR. CHURCHER: And it may assist the  
19 Board to turn to that interrogatory as I explain it,  
20 because there are a few numbers and it would be easier  
21 if we all have the numbers in front of us.

22 The first question they asked in Question  
23 No. 22 was: What was the cost of the '87 spray  
24 program? And we were able to calculate, using a figure  
25 of roughly \$25 a hectare to spray BT, the 76,000

1 hectares that were actually treated cost a little less  
2 than \$2-million to conduct that spray program in 1987.

3 And to compare that to what the estimated  
4 value of the wood that was sprayed, we then had to look  
5 at how much volume of each of the three species,  
6 susceptible species to the spruce budworm was.

7 Towards the bottom of that first page of  
8 Question No. 21, the first column are the three  
9 species: Balsam fir, white spruce and black spruce,  
10 and the approximate volume in cubic metres for each of  
11 those three species, and using a figure of \$150 per  
12 cubic metre, which is the approximate or estimated  
13 value of a cubic metre of wood in 1987 in terms of the  
14 added value or value added to the gross provincial  
15 product, we come up with a total value of wood that was  
16 sprayed of a little over \$1-billion. Again, the spray  
17 program itself cost a little less than \$2-million.

18 Now, that assumes of course that if we  
19 had not sprayed and did not spray, that all of those  
20 trees that we treated would have died, and that's  
21 probably not a completely fair assumption, not all of  
22 the trees will die.

23 So over onto the second page we assumed  
24 that of the balsam fir, which is most vulnerable to the  
25 spruce budworm, that we could conservatively expect 70

1 per cent of those trees to die. White spruce, which is  
2 a little less vulnerable, conservatively 35 per cent of  
3 the trees might have died and similarly balsam -- or  
4 black spruce, which is the least vulnerable of the  
5 three species, maybe only 15 per cent of the trees  
6 would have died.

7 And then using those percentage figures  
8 on those same volumes, using the same value of \$150 per  
9 cubic metre, we compute a value of \$484,000.

10 So in the worst-case scenario where the  
11 budworm kills all the trees it would be roughly a  
12 billion dollars worth of wood lost, and on a more  
13 conservative note it would have been at least  
14 \$484-million would have been killed.

15 MR. FREIDIN: And, Mr. Chairman, you  
16 recall that the concept of value added was described in  
17 Panel No. 5.

18 Q. Now, I understand that Forests for  
19 Tomorrow asked a related question in Interrogatory No.  
20 30?

21 MR. CHURCHER: A. That's correct. They  
22 wanted for the 1988 program -- Question No. 21 related  
23 to the 1987 spray program; Question No. 30 relates to  
24 the 1988 program.

25 But we have used, as far as costs are

1 concerned, the same figures for purposes of comparison.  
2 They were interested to know what was the cost of the  
3 spray program per cubic metre of wood sprayed and the  
4 cost works out to be roughly 66-cents per cubic metre.

5 Q. Cost per cubic metre of wood saved or  
6 sprayed?

7 A. Sprayed. Again, assuming that there  
8 would be some mortality.

9 Q. Okay.

10 MR. MARTEL: Could you have had an  
11 accelerated cut in any of that area, going back to 21?

12 MR. CHURCHER: I am sorry?

13 MR. MARTEL: Where you sprayed and you  
14 looked at the value, you estimated that it was going to  
15 be at the large end a billion, conservatively  
16 484-million, in that area, could you have had  
17 accelerated harvesting?

18 MR. CHURCHER: Yes, and in fact there  
19 actually was accelerated harvesting. If we think back  
20 to those two pie diagrams of Figure 5, that related to  
21 the 1987 program in the northcentral region and there  
22 was a certain component in that year was accelerated  
23 harvesting or salvage harvesting.

24 The volume figures that I have used in  
25 response to Interrogatory No. 1 -- or 21 are the

1 volumes of the trees that were actually sprayed, the  
2 volume of the trees was contained in each of the spray  
3 blocks or an estimate of volume.

4 So we accelerated the harvest and salvage  
5 harvested as much of the wood as we could possibly in  
6 that particular year and the other treatment that was  
7 used in 1978 was the use of BT.

8 MR. FREIDIN: Q. And the third question  
9 they asked, and I don't think we need to go through it,  
10 the answer, but asked for particulars of the actual  
11 value of wood saved compared to the predicted amount  
12 that would be lost based on control areas.

13 Now, when we look through the procedure  
14 that you have reviewed briefly, the definition of  
15 commercially operable forests and high value forests,  
16 the commercially operable would be the older trees in  
17 that they would be the ones which are going to be  
18 harvested in the next 10 years?

19 MR. CHURCHER: A. That's correct.

20 Q. And if we look at the high value  
21 forest, a number of the forests which are described  
22 there are young trees, and I am thinking of the  
23 indication that regeneration less than 21 years. Is  
24 there any specific reason to this emphasis on age?

25 A. Yes, there is. In the commercially

1 operable forests you would think that those trees that  
2 are going to be harvested within the next 10 years,  
3 those are going to be the oldest trees and, as Mr.  
4 Freidin indicated, the plantations or the regenerated  
5 areas are the ones that are between 0 and 20 years.

6 And these very old trees, and on the  
7 other extreme the very young trees, tend to be the most  
8 vulnerable to damage by insects. And the trees  
9 inbetween that, the trees between the ages of 20 and  
10 say 60 or 70 years old, those are the healthiest and  
11 most vigorous trees and they tend to be less vulnerable  
12 to damage by insects such as the spruce budworm.

13 A good analogy would be -- to put it in  
14 human terms, would be a disease such as pneumonia. If  
15 my 90-year-old great aunt contracted pneumonia, it  
16 could very well be fatal to her. Similarly, if one of  
17 my 10-month-old sons contracted pneumonia it could be  
18 very fatal to one of them. However, if I had pneumonia  
19 it probably would not be fatal, I would be able to ward  
20 it off. I may be sick for a while, but I would  
21 recover.

22 THE CHAIRMAN: It depends if we sprayed  
23 you or not.

24 MR. CHURCHER: And with what.

25 MR. FREIDIN: Q. In terms of the

1 limitation for foliage protection to a set number of  
2 years, whether it is 10 or whether it is 5 or 15, is  
3 there any reason for limiting foliage protection to a  
4 set number of years, a reason other than the ones you  
5 have mentioned already?

6 MR. CHURCHER: A. Yes. I think, as I  
7 indicated before, that if we started to treat larger  
8 and larger areas of the epidemic, as has been the case  
9 in provinces such as New Brunswick, that we could quite  
10 possibly interrupt the natural outcome of the epidemic.  
11 And, in that case, we might find ourself in a situation  
12 such as New Brunswick has placed itself in, where they  
13 would be going back year after year on a repeated basis  
14 treating the budworm.

15 Whereas, if we let the outbreak come to  
16 an end on its own, then we will not be perpetuating the  
17 epidemic itself.

18 Q. And why would you be perpetuating the  
19 epidemic itself if you were spraying every year in the  
20 fashion that they are there?

21 A. In effect what you are doing is  
22 saving the leaves on -- the needles on the trees so the  
23 trees don't die, which is the objective.

24 However, it has the unfortunate  
25 disadvantage of also perpetuating the food supply for

1 the spruce budworm. So that those budworms do survive  
2 or those budworms that blow in from Quebec or Maine or  
3 surrounding provinces have this ample food source there  
4 to continue feeding on; whereas if they were allowed to  
5 continue unabated over most of the area, they  
6 eventually will eat themselves out of house and home,  
7 as it were, and natural parasites and diseases and  
8 predators will be allowed to build up in the population  
9 and eventual bring it to a conclusion.

10 Q. Are there any reasons other than a  
11 biological reason such as that?

12 A. On a province the size of Ontario  
13 where we have at times up to 12- or 18-million hectares  
14 defoliated or damaged at any given time, it is also  
15 uneconomical and impractical and generally unfeasible  
16 to try to amass a spray program to treat that size of  
17 an area on an annual basis.

18 Q. Mr. Churcher, if we go back to page  
19 101 of the witness statement, that was the two pie  
20 charts--

21 A. Yes.

22 Q. --it indicates that of the areas  
23 eligible for protection, 81.4 per cent receive no  
24 treatment?

25 A. That's correct.

1 Q. And why is that the case?

2 A. That is I guess an example of what I  
3 have just been talking about where, for whatever  
4 reason, the areas that were eligible or determined not  
5 to require some form of treatment, either in the form  
6 of an insecticide spray program or a harvest or some  
7 other method to try and deal with the insect, and in  
8 those areas it was decided that no treatment was  
9 necessary, that the budworm outbreak would be allowed  
10 to continue on its own natural course.

11 Q. Now, in your paper--

12 A. For that particular year, I should  
13 add. That's not to say that we may have treated some  
14 of those stands that were included in that 81.4 per  
15 cent, they may have been treated the previous year or  
16 they may have been treated in 1988, the following year.

17 Q. Starting on page 96 of the witness  
18 statement, you identify a number of factors which are  
19 considered when determining which eligible areas will  
20 be sprayed. And I am wondering whether you could  
21 advise where those particular factors come into play in  
22 deciding which eligible areas will be sprayed?

23 A. Well, after you have identified which  
24 of the areas are eligible to be sprayed, then you  
25 determine which ones you are going to actually spray

1 and which ones you are going to leave untreated. And  
2 there are nine factors listed beginning on page 96 and  
3 running to, I believe, the bottom of page 99.

4 And there are various criteria that have  
5 to be looked at and evaluated in selecting which stands  
6 should be sprayed. And the factors that would be  
7 considered, very briefly, are the history of the  
8 infestation, how long it has been in that particular  
9 area; the condition of the stand, which of course is  
10 related to the history, the longer the infestation has  
11 been there the worst condition the stand will be in;  
12 the value of that particular stand, whether it is a  
13 high -- reasonably high value or if it poses no  
14 particular value; the history of the spraying that has  
15 gone on in the past, if it was treated just last year  
16 and we got good protection from the spray program, it  
17 may not be necessary to spray it again this year.

18 How much hardwood is in the stand,  
19 especially if it is a dominant hardwood, in which case  
20 spraying would not be particularly feasible because it  
21 would be difficult to get the spray droplets through  
22 that hardwood canopy into the conifer species;  
23 consideration of what other management techniques might  
24 be viable or equally as effective or possibly even more  
25 effective in that particular area.

1 effective in that particular area.

2 The seventh criteria is what is planned  
3 for that stand in the future: Is it going to be cut,  
4 is it a park, those types of considerations; also the  
5 operability of the stand, is it possible to actually go  
6 in and harvest that area. If it is on the side of a  
7 steep slope, then it would be very unlikely that stand  
8 is going to be cut anyway and so there would be little  
9 point in spraying it.

10 And the final consideration that would  
11 have to be taken into account is the application of  
12 buffer zones. If one was considering spraying an area,  
13 then would the use of buffer zones around various areas  
14 such as water courses or permanent habitation, would  
15 that limit or essentially make the spray block  
16 unsprayable or inoperable.

17 Q. I believe that gets us to the end of  
18 message No. 5. If we can move on to No. 6 which deals  
19 with the use of insecticides.

20 You referred in your evidence to the  
21 policy of 1980 which is found on page 174, Mr.  
22 Churcher, and that contains the comment regarding the  
23 use of chemical insecticides, and that particular  
24 reference is repeated in the '85 policy at page 148.

25 Can you advise whether this policy has

1       been implemented vis-a-vis the move to the alternative  
2       of -- a move to an alternative to chemicals?

3                   A. Yes, it has, and that fact is shown  
4       in Table 2 which is found on page 107 -- the new page  
5       107 that was distributed just before lunch.

6                   As was indicated, the policy first came  
7       into effect in 1980 and on that Table 2 you note,  
8       beginning in 1980, a marked increase in the amount of  
9       BT that was used in the annual spray programs and that  
10      increase continues from 1980 up until 1984 and, in  
11      effect 1985 when by 1985 we were using only BT and no  
12      chemical insecticides in our aerial spray programs.

13                  Q. Mr. Churcher, I understand that you  
14      were involved in the committee which was planning the  
15      insecticide spray program for 1985. Did the  
16      recommendation of that committee address the issue of  
17      using chemical insecticides?

18                  A. Yes, it did. Actually there were two  
19      or three committees that I sat on in 1985. One was in  
20      this particular region and addressed the spruce budworm  
21      problem and the proposals for dealing with spruce  
22      budworm in the northcentral region, Thunder Bay  
23      District in particular.

24                  There was also a similar committee in the  
25      northeastern part of the province, the northern and

1 northeast regions that looked at the jack pine budworm  
2 situation in that part of the province and prepared the  
3 proposals for treating that insect in 1985.

4 In both the cases there was a portion of  
5 the proposal that contained the use of chemical  
6 insecticides on some portion of the spray areas, as  
7 well as the use of biological insecticide, BT, on other  
8 areas of the spray proposals.

9 Q. Did you agree with the recommendation  
10 that there be both chemical and biological insecticides  
11 used in that year's spray program?

12 A. Yes, I did.

13 Q. Why?

14 A. As a professional entomologist and my  
15 role as the forest entomologist for the Ministry, it  
16 was my advice to the people and the advice of other  
17 members of the committee that both chemicals and  
18 insecticides -- chemical insecticides and biological  
19 insecticides were viable options that should be  
20 considered and, indeed, included in the proposals to  
21 treat that area -- to treat those various insects.

22 There were some areas that it was felt  
23 and I felt that chemical insecticide might prove more  
24 effective and other areas where I felt that BT, for  
25 various reasons, was the better option.

1 Q. Now, as we see from page 107, Table  
2 No. 2, in 1985 no chemical insecticide was used in the  
3 spray program. Are you aware as to the reason that the  
4 recommendation or the proposal that which was made was  
5 not accepted?

6 A. I am not aware of all of the reasons  
7 that led to the decisions; however, in May of 1985 the  
8 Minister at the time, Michael Harris, made the decision  
9 that the 1985 spray program would implement only the  
10 biological -- or use only the biological insecticide  
11 BT.

12 Q. I understand that there was a News  
13 Release which contained the -- a News Release issued by  
14 the Minister dated May the 7th, 1985?

15 A. That's correct.

16 Q. And perhaps I could also ask you, in  
17 the following year was chemical insecticide used in the  
18 spray program?

19 A. No, chemical insecticide was not used  
20 in either the '85 or the '86 program.

21 Q. And I understand that a News Release  
22 by the Minister of Natural Resources was issued in  
23 relation to that decision dated February the 13th,  
24 1986?

25 A. That's correct, yes.

1 MR. FREIDIN: Mr. Chairman, perhaps I  
2 could file as --

3 THE CHAIRMAN: Separately or ...

4 MR. FREIDIN: Yes, I think we should do  
5 them separately.

6 THE CHAIRMAN: All right. The first News  
7 Release will be Exhibit 635, the second will be Exhibit  
8 636.

9 ---EXHIBIT No. 635: News Release by the Minister  
10 of Natural Resources dated May  
7, 1985.

11 ---EXHIBIT NO. 636: News Release by the Minister of  
12 Natural Resources dated February  
13, 1986.

13 MR. MARTEL: Was there a recommendation  
14 in 1986, Mr. Churcher, to still go with both  
15 approaches?

16 MR. CHURCHER: Yes, there was, Mr.  
17 Martel. Again, I sat on a number of different regional  
18 working committees in 19 -- the fall of 1985, the  
19 winter of 85/86 leading up to the '86 spray program.

20 MR. MARTEL: Have the results of the BT  
21 been better than expected?

22 MR. CHURCHER: No, I think the -- by and  
23 large the results of the BT that we obtained were as  
24 what we expected, they would be.

25 In some cases, in the case of jack pine

1 budworm, for instance, we had never treated jack pine  
2 budworm with BT before so we didn't really know what  
3 results to expect from that, but the BT proved very  
4 effective in controlling the defoliation of the jack  
5 pine budworm.

6 MR. FREIDIN: Q. And do these News  
7 Releases -- any portion of these News Releases identify  
8 the Minister's view as to why the use of chemical  
9 insecticides wouldn't be used?

10 MR. CHURCHER: A. Yes, the 1985 News  
11 Release in the second page, the second to the last full  
12 paragraph quotes the Minister as saying:

13 "I have decided to proceed with an  
14 insecticide which is the most acceptable  
15 from an environmental standpoint."

16 So I would assume that' that was the  
17 basis of his decision.

18 In the 1986 News Release, the very first  
19 page, the second full paragraph, it quotes the then  
20 Minister, Vincent Kerrio, as saying:

21 "Under the circumstances of a minority  
22 government, we have decided to proceed  
23 with the biological spray program this  
24 year. This was the only way we could get  
25 all parties' support for any aerial

1 spraying program to battle the present  
2 budworm and gypsy moth infestation."

3 Q. And in the next paragraph it states:  
4 "We do not have the option of  
5 implementing the exact program we  
6 proposed to the public, we do have a  
7 program that will be far reaching and  
8 effective."

9 And are you aware of the program -- the  
10 proposed program to which he is referring?

11 A. Yes. And, as Mr. Martel indicated,  
12 that would be the 1986 proposal which also included the  
13 use of both chemical insecticides and biological  
14 insecticides.

15 Q. I can see on the last paragraph of  
16 that particular News Release there is a further comment  
17 about the minority government situation.

18 Did -- there is reference to open houses  
19 in the 1985 News Release, they were held in January and  
20 early February this year. You find that notation on  
21 the second page of that News Release. Were you  
22 involved in those?

23 A. I was involved in some of them, yes.  
24 I believe there were roughly 20 news -- 20 open houses  
25 across the province and I was involved in about half a

1 dozen of them.

2 Q. And are you able to advise the  
3 reaction or views that were received from the public  
4 regarding the spray program to, in particular, what was  
5 going to be sprayed?

6 MS. CRONK: Excuse me a moment, Mr.  
7 Chairman. I'm sorry, Mr. Churcher, just before you  
8 answer that question.

9 You will understand, sir, perhaps why I  
10 rise. The witness has indicated that he participated  
11 in a number but not all of those sessions. He has now  
12 been asked to relay to the Board what expressions of  
13 view took place by members of the public. In the  
14 normal course, that would have to be documented in a  
15 way that it was not hearsay.

16 THE CHAIRMAN: Well, you can certainly  
17 talk about, Mr. Churcher -- thank you, Ms. Cronk.

18 You can indicate in your answer what you  
19 are aware of from those public information programs  
20 that you specifically took part in, but not ones  
21 necessarily that you didn't take part in, unless you  
22 can refer to some documents specifically by someone who  
23 did take part, otherwise it would be hearsay as far as  
24 the other ones are concerned.

25 MR. CHURCHER: Fair enough.

1 MR. FREIDIN: Q. Perhaps when you give  
2 your answer you can give an indication of the open  
3 houses that you were engaged in ?

4 MR. CHURCHER: A. As I recall, I was  
5 involved in the open houses that were held in Thunder  
6 Bay that addressed the spruce budworm -- proposed  
7 spruce budworm program, as well as an open house in  
8 Onaping Falls northwest of the Town of Sudbury -- City  
9 of Sudbury; an open house in Espanola, an open house  
10 in -- Elliott Lake was the meeting location, as well as  
11 an open house in Chapleau.

12 In the last four that I stated, Chapleau,  
13 Elliott Lake, Espanola and Onaping Falls, all related  
14 to the proposed jack pine budworm spray program for  
15 1985.

16 The structure of the open houses was  
17 essentially the same in all that I attended, as well as  
18 all of the others, where it was intended to be the same  
19 in all of the others even though I was not there. And  
20 it was structured in that the public was presented with  
21 three or four different options as to how we could go  
22 about dealing with the various insect pests in that  
23 particular area.

24 And one option included both the use of  
25 chemicals and biologicals, another option would include

1 less chemicals and more biologicals, another option  
2 would include just the use of biological insecticides,  
3 and a final option would be using no insecticides  
4 whatsoever, dealing with it as much as possible through  
5 harvesting -- accelerated harvesting reallocated  
6 harvesting, salvage harvesting, but not using  
7 insecticides whatsoever.

8 The response from the public and comments  
9 received from the public at the open houses that I  
10 attended was generally in favour of the option or  
11 options that contained the use of insecticides, more  
12 specifically the options that contained both chemical  
13 and biological insecticides.

14 Q. Now, in the News Release of February  
15 the 13th, '86 which is exhibit...

16 MS. MURPHY: 636 I think.

17 MR. FREIDIN: Q. Exhibit 636, there is  
18 reference in the last paragraph that I just referred  
19 generally to. It states that:

20 "We wanted that public consultation..."

21 Referring to -- well, let's go to the  
22 second last paragraph:

23 "To all those who participated in the  
24 open houses, including many  
25 representatives from the industry and

1 individual members of the public, I would  
2 extend my thanks for their  
3 participation."

4 Mr. Kerrio said.

5 "We wanted that public consultation  
6 process to run its course, but that  
7 option has been removed."

8 And makes the comment about the minority government  
9 situation. Are you aware of what he means by saying  
10 the he wanted the public consultation process to run  
11 its course but that option has been removed?

12 MR. CHURCHER: A. The open houses each  
13 year or the information centres that are held are  
14 normally held in the month of January and usually last  
15 one or two days. However, the public is given the  
16 opportunity for a 30-day period following that to  
17 provide their comments to the Ministry.

18 And the News Release that was -- that we  
19 are referring to here in 1986, the date is February the  
20 13th, so as you will note the 30-day period hadn't  
21 fully elapsed for the open houses, roughly half of the  
22 30-day period had elapsed. The public still had  
23 another 15 days roughly to make their comments known to  
24 the Ministry after this statement was made.

25 And so essentially I understand those

1 last two paragraphs to amount to an apology on the part  
2 of the Minister to the members of the public for having  
3 to make his decision prior to hearing all of their  
4 comments.

5 Q. Mr. Churcher, in the material there  
6 is reference or comment which indicates that biological  
7 insecticides are more specific to their hosts than  
8 chemical insecticides. Could you explain what that  
9 means?

10 A. Yes. Chemical insecticides by their  
11 nature tend to be more -- tend to affect a wider range  
12 of insects; whereas a biological insecticide by its  
13 nature, being a natural disease in most cases of some  
14 form or other, is very specific, it only affects  
15 particular insect species or, in some cases, like BT a  
16 group of insect species but not all insects.

17 So a chemical insecticide such as  
18 malathion which is a very common household insecticide  
19 for treating everything from your household plants to  
20 tomatoe crops and your rose bushes and all the various  
21 insects that might affect those various plants,  
22 everything from beetles to caterpillars to aphids to  
23 spiders and everything else with six or eight legs that  
24 crawls around, BT affects only those caterpillars that  
25 eventually grow up and turn into moths or butterflies;

1 in other words, those members of the insect order  
2 lepidoptera.

3 And it is also only effective -- only  
4 becomes effective when it is ingested by the insect or  
5 when it's eaten. Once the bacteria, bacillus  
6 thuringiensis, is in the stomach of the insect are  
7 conditions that such that the bacteria becomes toxic or  
8 virulent and it then begins to break down the stomach  
9 lining of the insect and causes the insect to stop  
10 feeding and eventually die.

11 And because of the very specific mode of  
12 action, and because it needs these very specific  
13 conditions in the stomach of the insect, that is only  
14 those insects in the order of lepidoptera, as I say,  
15 that have those specific factors that allow the BT to  
16 do its thing.

17 Now, in the case of other biological  
18 insecticides such as some viruses or viruses in  
19 general, they are even more specific. The virus that  
20 affects gypsy moth affects only gypsy moth and no other  
21 insects. The virus that affects an insect known as the  
22 red-headed pine saw fly affects only that particular  
23 type of insect. Another related saw fly, a very  
24 closely related insect known as the European pine saw  
25 fly has its own specific virus that affects it.

1                   Q. Now, Mr. Churcher, if we refer back  
2 to the policy of 1985 at page 148, and it's the same  
3 paragraph that we have referred to a number of times,  
4 it deals with chemical versus biological insecticides,  
5 in the last sentence it states that:

6                   "The Ministry will also actively promote  
7 and support research and development on  
8 insect control techniques which will  
9 reduce our reliance on chemical  
10 insecticides."

11                  Has anything been done in that regard  
12 since the policy was developed?

13                  A. Yes, there has. The Ministry has  
14 been involved in a number of different research  
15 development projects.

16                  Q. And I understand the same provision  
17 is found in the 1980 policy as well, so it has been  
18 around since then?

19                  A. That's correct.

20                  Q. Okay. So perhaps you could  
21 explain -- well, I understand that OFIA in their  
22 Interrogatory 13 asked about funding per annum  
23 committed by the Ministry for research and development  
24 regarding insect control including chemical  
25 insecticides.

1                   They also asked what the anticipated  
2                   funding for 1988 and '89 were. And was the Ministry  
3                   able to provide a response?

4                   A. Yes, we were and I was able to list a  
5                   number of different projects which the Ministry had  
6                   been involved in since 1980, as well as give an  
7                   indication as to how much money was spent in the fiscal  
8                   year 1988-89.

9                   And very briefly, the projects that I  
10                  discussed were the identification of sex pheromones on  
11                  the part of insects. This is a naturally occurring  
12                  hormone, if you will, produced by the female to attract  
13                  the male to her so that they can mate and reproduce.  
14                  And these pheromones can be identified and elucidated  
15                  and can be reproduced in the lab, but first of all you  
16                  have got to identify what the various components of  
17                  pheromone are.

18                  So the Ministry has supported research  
19                  into this particular project, working on pheromones for  
20                  the oak leaf shredder as well as the jack pine budworm  
21                  on a number of different years.

22                  The Ministry has also been very much  
23                  involved in the use of and development of a small  
24                  parasitic wasp that lays its eggs within the eggs of  
25                  the spruce budworm rendering them unviable.

1                   And the program began I believe in 1981,  
2           it was a joint program between the Ministry of Natural  
3           Resources, University of Toronto, University of Guelph,  
4           and the Canadian Forestry Service and that program has  
5           continued on.

6                   Our support for that program has  
7           continued as well to the point that now a major  
8           insecticide -- pharmaceutical insecticide company,  
9           Ciba-Geigy is hoping to take that over and take it from  
10          the research development stage and begin operationally  
11          or commercially raising these wasps for resale and use  
12          in the forestry sector as well as elsewhere.

13                   And that interrogatory goes on to discuss  
14          other projects that deal specifically with insecticides  
15          and also application technology, some of the things  
16          that Mr. Nicholson and Mr. Isra will talk about  
17          tomorrow, about some of our work in developing the  
18          field and the science of application technology of  
19          applying insecticides.

20                   Q.   There is reference here -- we have  
21          made a lot of reference to the use of BT.   When was  
22          that particular product developed?

23                   A.   The product began to be developed I  
24          believe in the late 50s or the early 60s, there are  
25          research papers and studies dating back that far, that

1 looked at the BT and its effectiveness on various  
2 insects and its possible uses. However, it only became  
3 commonly used in the late 70s and early 80s as  
4 indicated on the table on page 107.

5 The Ministry's -- much of the Ministry's  
6 use of BT in some of those years, in 1970 was on an  
7 experimental developmental basis. The products were  
8 not necessarily registered at that particular time, we  
9 were using them on an experimental basis with an  
10 experimental permit from Agriculture Canada to help the  
11 companies develop their product better and to provide  
12 data to them to show Agriculture Canada that these  
13 products indeed were effective in killing the insects,  
14 so that the company could then proceed and get the  
15 product registered in Canada.

16 Q. Are there biological insecticides  
17 used or available for use other than BT?

18 A. There is one other biological  
19 insecticide that is registered in Canada that we use in  
20 Ontario and that is the virus I spoke of before for the  
21 red-headed pine saw fly known as lacont virus. It was  
22 developed by a scientist at Forestry Canada who have  
23 also been working on similar viruses for the gypsy moth  
24 and the other saw fly I mentioned, the European pine  
25 saw fly.

1 Q. Why are there only two such  
2 insecticides?

3 A. Similar to the comment that was -- or  
4 the statement made by Dr. Campbell yesterday, is that  
5 in relation to the herbicide available for forestry  
6 use, we tend to piggyback on the herbicides that are  
7 available for agricultural use.

8 The similar situation is found in  
9 insecticides as well. And chemical insecticides, as I  
10 said, are more broad reaching in their applications.  
11 Biological insecticides by their nature, as I also  
12 mentioned, are much more specific and so it's not  
13 commercially viable for a company to set up and to try  
14 and produce a gypsy moth virus that only has one  
15 application, to be sprayed on gypsy moths. There  
16 aren't enough people in the world spraying gypsy moths  
17 to make that an economically viable proposition.

18 So it is only in some situations where  
19 you get a BT or a product like BT that has wider  
20 applications, it can be used in forestry as well as  
21 agricultural crops and a number of different species of  
22 insects, that an industry is interested in producing  
23 and formulating that product and selling it  
24 commercially.

25 Q. Now, Mr. Churcher, if we could move

1 on then to message No. 7, interpretation of results of  
2 insecticide spraying requires consideration of many  
3 variables. I understand that your evidence will  
4 address Mr. Martel's question about effectiveness of BT  
5 amongst other things; is that correct?

6 A. Yes.

7 Q. And perhaps you could indicate then  
8 how you go about or how you have gone about assessing  
9 your spray program in terms of its effectiveness?

10 A. Before we deal with that I would  
11 like, if we could, to move to the chart and draw a  
12 simple graph that I think will help us understand some  
13 of the variables.

14 My apologies to my fellow panel members.  
15 Is that visible to...

16 Q. Do you want to take a mike.

17 A. To begin with, on the vertical axis  
18 represents the number of larvae or caterpillars that we  
19 would be treating. The horizontal axis is essentially  
20 progression over time and we will express that not in  
21 days or weeks or years, but in the development of the  
22 insect, the development of these larvae.

23 And these larvae normally go through a  
24 number of different stages as they grow in size and  
25 each stage is called an instar, often denoted by an L2

1 indicating this is the second larval instar.

2 So we start with the L2, L3 on to the 6th  
3 larval instar and finally the pupae or the next stage,  
4 the cocoon, if you will, of the insect. And again we  
5 are talking about insects such as spruce budworm, jack  
6 pine budworm, gypsy moth.

7 Q. I don't know whether it would be  
8 possible, Mr. Churcher, but is it possible for you to  
9 stand on the other side and draw from that side,  
10 without blocking out the Board's view, but perhaps  
11 giving those of us over here a better view of what you  
12 are doing.

13 Well, maybe you can't, I don't know.

14 A. We will try, Mr. Freidin.

15 Q. We have never had this problem  
16 before, I am not too sure why not.

17 A. At the beginning of the year where we  
18 have the second larval instar we will have a number of  
19 insects - it doesn't really matter how many insects -  
20 but we will have some insects. And over the course of  
21 the season the number of insects that are there will  
22 decrease due to natural factors; birds will come along  
23 and eat a few and some will fall off the tree and get  
24 lost and not be able to climb back up or some will  
25 succumb to parasites and others will die because of

1 diseases. And that would be the natural course of  
2 events if you did not spray.

3 Now, if we sprayed right there, roughly  
4 somewhere between the third and fourth larval instars  
5 which is when we time the spray for a spruce budworm  
6 program, the effect that you are attempting to have is  
7 to kill a number of insects. So this number of larvae  
8 should drop off quite rapidly and this would be the  
9 effect of the insecticide spray.

10 And you have killed as many as you are  
11 going to kill because the use of the insecticide and  
12 you do not kill all of the insects by any means, then  
13 some of these other natural mortality factors then come  
14 into play. Those that remain that you have not killed  
15 with the use of the insecticide are then still there  
16 and are susceptible to the birds and the diseases and  
17 the parasites and the other predators. So at the end  
18 point in time you may very well end up with the same  
19 number of bugs.

20 However, the area between these two lines  
21 represents the number of insects that you have killed  
22 and we can interpret that or equate that to be the  
23 amount of foliage that you have saved; if the insects  
24 are dead, then they are not there eating foliage.

25 In case I refer to this again - and so I

1 don't forget myself - I better label this.

2 MR. FREIDIN: Can we give that an exhibit  
3 number, Mr. Chairman?

4 THE CHAIRMAN: Very well. That will be  
5 Exhibit 637.

6 THE CHAIRMAN: What are you going to call  
7 that, Mr. Churcher?

8 MR. CHURCHER: That's a good question,  
9 Mr. Chairman. A graph showing the effects of a spray  
10 on the larval population.

11 ---EXHIBIT NO. 637: Hand-drawn graph by Mr. Churcher  
12 showing the effects of a spray on  
the larval population.

13 MR. FREIDIN: That is not very exciting  
14 Mr. Churcher, but I guess it will do.

15 THE CHAIRMAN: Something like bugs  
16 killed/foilage saved.

17 MR. CHURCHER: I like that. Is it too  
18 late to change the title.

19 MR. FREIDIN: Q. And you just indicated  
20 on there that the blue line identifies the drop in  
21 larvae over time which are untreated, and the red line  
22 indicates the trend as to what happens with the  
23 populations of larvae if in fact you spray?

24 MR. CHURCHER: A. That's correct. Now,  
25 one other point I would like to make on this graph

1 before I sit down again.

2 This could -- of course, you are going to  
3 have the most effect or you are going to kill the most  
4 insects if you spray at the most optimum time. If this  
5 spray for whatever reason was delayed somewhat, then  
6 you will be killing fewer insect, the area between  
7 these two lines will be less and you will also be  
8 saving less foliage.

9 MR. MARTEL: Are those two lines  
10 deliberately coming together near the bottom, near the  
11 pupa stage? In other words, if you had took it far  
12 enough, would you have ended up with the same number of  
13 larvae or pupas had you not sprayed?

14 MR. CHURCHER: It is quite possible and,  
15 in fact, that is not uncommon. So to answer your  
16 question, yes, that was done intentionally.

17 MR. MARTIN: Thank you.

18 MR. CHURCHER: And that point, we will  
19 come back to that in the explanation of some of the  
20 spray results.

21 MR. FREIDIN: Q. You indicated about  
22 spraying at the most effective or most optimum time.  
23 Is there a time frame or a spray window in which you  
24 have to spray?

25 MR. CHURCHER: A. Yes. You spray -- the

1 timing of spraying, as I indicated, is related to  
2 exactly the development of the insect. In the case of  
3 spruce budworm, it's usually somewhere between the  
4 third the and fourth larval instar. The gypsy moth,  
5 it's a little bit earlier.

6 But it's not only timed to the  
7 development of the insect, but it is also timed to the  
8 development of the foliage as well. In the case of  
9 gypsy moth, you have to wait until there is some  
10 foliage out there, that the leave have begun to expand  
11 so that there is a platform out there or there is  
12 something out there that is going to catch the droplets  
13 that you spray. And, of course, there has to be  
14 something there for the insects to feed, if you are  
15 using a stomach insecticide such as spruce budworm,  
16 because they have to ingest -- or stomach insecticide  
17 such as BT - excuse me - since they have to ingest it.

18 Q. Now, when you are talking -- sorry,  
19 go ahead.

20 A. So that is how this spray -- how you  
21 determine what the beginning of the spray window is.

22 Usually there is a period of time after  
23 that, two weeks, two and a half weeks where it is  
24 still -- the insects are still susceptible to the spray  
25 and all of the spraying that you do has to be done in

1       that period of time.

2                       There comes a point, as we get down here  
3       closer and closer to the end, where it's no longer  
4       viable to spray. You will not be killing that many  
5       insects for one thing and you certainly will not be  
6       protecting very much foliage. The insects have already  
7       done much of the damage that they are going to do for  
8       the year and so, at that point, that determines when  
9       the spray window ends or when it is no longer advisable  
10      or it no longer makes very much sense essentially to  
11      continue spraying.

12                    Q. So the spray window is the time at  
13      which -- calculated from when you can effectively start  
14      spraying until you can no longer effectively spray?

15                    A. That's correct. And, of course, the  
16      spray window would definitely end when all of the  
17      insects are in the pupal stage because they are no  
18      longer feeding at that stage.

19                    So depending on when you spray in that  
20      spray window is going to also affect the results that  
21      you can obtain.

22                    Q. Do the spray windows vary for the  
23      different insects, the four insects we have referred  
24      to?

25                    A. Yes, they do. They develop at

1 different rates and so, therefore, that may extend or  
2 shorten the amount of time that you can spray or the  
3 number of weeks that you can spray. But, generally  
4 speaking, a round figure of two or two and a half weeks  
5 would be a general figure.

6 THE CHAIRMAN: Mr. Churcher, do the spray  
7 windows also vary in accordance with the insecticide  
8 you use?

9 MR. CHURCHER: Yes, they do. The spray  
10 window for a chemical insecticide tends to be a little  
11 bit longer, especially if that chemical insecticide  
12 acts -- is a contact poison; in other words, the  
13 insects don't have to eat it, they just have to come in  
14 contact with it.

15 In that case you could start to spray a  
16 little bit earlier perhaps, you could begin spraying a  
17 little bit earlier. So in effect you are shifting this  
18 line to the left somewhat, you will end up killing more  
19 insects and quite possibly protecting more foliage  
20 possibly, or in theory at any rate.

21 Chemical insecticides also tend to be a  
22 little more resistant or persistent than BT. BT breaks  
23 down very quickly in sunlight, is no longer effective  
24 in sunlight. It also is washed off the foliage very  
25 easily; whereas chemical insecticides do not have those

1 disadvantages, they can last on the foliage and remain  
2 effective for four or five, maybe six or seven days  
3 before they break down and are rendered ineffective.

4 If they are no other questions, I and my  
5 colleagues can take our seats again.

6 MR. FREIDIN: Q. If I might, Mr.  
7 Churcher, I would just like to ask you a question, it's  
8 basically the repeat of a question that was asked by  
9 OFIA, but in relation to Mr. Nicholson's paper.

10 At page 249 of the witness statement is  
11 the comment at the bottom, and reference to certain  
12 technology. It says:

13 "Complementing this technical improvement  
14 is the fact that all insecticides used in  
15 today's forestry programs are short lived  
16 and must prove their efficacy by  
17 Virtue of their distribution and not by  
18 any residual (long lasting) effects."

19 And could you advise me: What is meant  
20 when it states 'insecticides used in Ontario are short  
21 lived'?

22 MR. CHURCHER: A. It means that their  
23 effectiveness or that they are only effective for a  
24 short period of time.

25 As I indicated, BT is essentially only

1 effective for a day or two before it's degraded by  
2 sunlight or it's washed off the foliage. Chemical  
3 insecticides only persist in the environment for a  
4 matter of days, anywhere from four to seven days before  
5 they too begin to break down and are rendered  
6 ineffective.

7 THE CHAIRMAN: Are you saying that they  
8 are ineffective vis-a-vis the insect, or impotent in  
9 terms of the environment; in other words, there is no  
10 damage to the environment other than insects for a  
11 short period of time?

12 You are talking just about the effect on  
13 the insect; are you not?

14 MR. CHURCHER: Primarily the insect but  
15 also the environment as well. That the molecule, if  
16 you will, breaks down into its component parts and  
17 those component parts do not have any effect on the  
18 insect but they also would have limited effect on the  
19 environment and that I believe Mr. Kingsbury will get  
20 into that a little bit more when he's here in August.

21 MR. FREIDIN: Q. Now, if we could  
22 then -- you indicated you wanted to draw that graph  
23 before you got into dealing with the assessment of the  
24 spray program or the effectiveness of the spray  
25 program.

1 MR. CHURCHER: A. Yes. Keeping those  
2 few principles in mind, if we could turn to page 209 of  
3 the evidence statement which is Table 6 of the paper  
4 authored by Howse and Churcher which talks about the  
5 spray results from the 1988 spruce budworm spray  
6 program in Thunder Bay District northcentral region.

7 Q. So this would be a year in which the  
8 only insecticide that would have been used would have  
9 been BT?

10 A. That's correct.

11 Q. Okay. Perhaps you could walk us  
12 through that table so we know how to read it?

13 A. There are seven columns across the  
14 table. It might help us if we number each of the  
15 columns, but as we go across I'll explain what each  
16 column stands for.

17 The first column starting on the left is  
18 titled Location, that's reasonably self-explanatory.  
19 That's the location of the spray block in question.

20 The second column is titled Spray date.  
21 Again, that is the date that that particular block was  
22 sprayed.

23 The third column is the Host, the host  
24 species or the tree species that was being sampled, and  
25 the -- in that column we have the captions bF which

1 stands for balsam fir, wS which stands for white  
2 spruce, and in some of the following tables you may  
3 find reference to bS which stands for black spruce.

4 THE CHAIRMAN: Among other things.

5 MR. CHURCHER: The fourth column is  
6 number of plots and that indicates the number of plots  
7 that were in that block; in other words, the number of  
8 plots that were used to obtain these results.

9 The fifth column is titled Prespray  
10 Larvae per 46 cm branch tip. That -- or the number  
11 of -- that represents the number of caterpillars that  
12 were on a 46-cm or 18-inch branch tip as it was  
13 surveyed just prior to the spray, a day or two before  
14 the spray was actually put down. So that provides you  
15 with the picture of what was in the situation before we  
16 sprayed.

17 Q. Just while we are on that column, Mr.  
18 Churcher, I notice for each location there are two  
19 entries and for the column No. 5, Prespray Larvae, the  
20 numbers appear to be relatively close. Is that by  
21 design or by chance?

22 A. No, that is by design. Each of -- as  
23 we work through the graph or through the table you will  
24 see that the data is arranged in pairs or in couplets.  
25 So the first line, the location is Arrow Lake and right

1 below that there is the word Checks which is the  
2 untreated -- the corresponding untreated check block.  
3 It was left untreated for comparison purposes.

4 The two numbers that Mr. Freidin has  
5 referred to in column 5 are the number of larvae that  
6 were on the branch just prior to spraying, and the  
7 check blocks have been selected on purpose to represent  
8 the same -- very similar situations, the same number of  
9 bugs in the untreated area as was in the treated area.  
10 So in each of the cuplets down that column the two  
11 numbers should be very similar.

12 To continue on then, the sixth column is  
13 the Population reduction due to spray expressed as per  
14 cent; in other words, what percentage of insects --  
15 what percentage of 21.8 insects died because of the  
16 insecticide treatment.

17 And the final column on the far right,  
18 column No. 7, is titled 1988 defoliation, also  
19 expressed in per cent; in other words, how much  
20 defoliation did those insects cause on the current  
21 year's defoliation -- or current year's foliage in  
22 1988.

23 Q. And just three quick questions. In  
24 relation to column No. 5, when is that survey done in  
25 relation to the spray date?

1                   A. That is conducted as close as  
2 possible just prior to the spray, usually a day or  
3 possibly two days before the spray is conducted.

4                   Q. And in column No. 6, when is the  
5 population reduction determined?

6                   A. That is normally done a couple of  
7 weeks, possibly longer, after the spray. At that time  
8 the survey crews will go back to the same plots,  
9 determine how many larvae they see, how many larvae are  
10 remaining alive and, at the same time, determine how  
11 much defoliation occurred.

12                   So it is usually the second visit, the  
13 post-spray visit usually occurs after most of the  
14 insects have reached the pupal stage; in other words,  
15 after as much feeding is going to happen has indeed  
16 occurred.

17                   Q. All right. And the same question for  
18 column 7?

19                   A. Yes, I think I covered that off in my  
20 answer.

21                   Q. All right. I am sorry, you did.  
22 Okay. Can you assess whether we have good results by  
23 looking at column 7 alone?

24                   A. No, there are a number of items that  
25 have to be taken into account when you are evaluating

1 and interpreting some of these results. Each of the  
2 columns is there for a reason. Each column provides  
3 some specific information that helps interpret these  
4 results.

5 If we just look at the very first cuplet,  
6 the first pair of Arrow Lake and its checks, we will  
7 see that it was sprayed on May 30th and June 1st, 1988,  
8 that the post-tree that was sampled was balsam fir,  
9 that there were 10 plots sampled. We already talked  
10 about the prespray population.

11 That in that spray program there were 95  
12 per cent of the insects that died because of the  
13 treatment and that in the sprayed area in Arrow Lake  
14 there was only 15 per cent defoliation; in other words  
15 85 per cent of the foliage remained, whereas in the  
16 corresponding check block there was 54 per cent  
17 defoliation.

18 We could compare that figure and that  
19 line with the fifth cuplet, would be a reasonable  
20 comparison if we were looking at how effective the  
21 treatment was on balsam fir versus white spruce. And  
22 the fifth cuplet I am looking at is titled Bedivere  
23 Lake, Block W.

24 Essentially all the factors in there are  
25 the same. We are talking about roughly the same spray

1 date, early June, we are talking about roughly the same  
2 insect populations prior to spray, low 20s insects  
3 per -- insects per 18-inch branch tip. The only  
4 difference is the host. In Arrow Lake we are talking  
5 about balsam fir, in Bedivere Lake we are talking about  
6 white spruce.

7 And you note that in the far right-hand  
8 column for Arrow Lake, the balsam fir block, we had 15  
9 per cent defoliation, whereas in the white spruce or  
10 the Bedivere Lake block it's 26 per cent. And it is  
11 explained because it is easier to spray and easier to  
12 protect balsam fir than it is to protect white spruce.

13 Each of the columns similarly can have an  
14 effect on the results you get. Looking again at the  
15 Bedivere Lake block, if we look at the effect of  
16 prespray populations we would look for a block that has  
17 also had white spruce, that was also sprayed roughly  
18 the same time. So I would compare that Bedivere Lake,  
19 Block W, to the second cuplet entitled Arrow Lake white  
20 spruce.

21 And in that one you will notice that we  
22 started out prior to spraying with 50 larvae on an  
23 18-inch branch tip. And to help you picture that, 18  
24 inches or 46 cm is roughly the length of your forearm.  
25 So from the tip of your elbow to the tip of your index

1 finger is roughly 18 inches.

2 So if you can picture your forearm being  
3 a tree branch and if you can picture 50 insects running  
4 up and down your forearm or your tree branch, perhaps  
5 you wouldn't like to picture that, but that's quite a  
6 number of insects, all of them hungry, all of them  
7 wanting to eat something and that's quite a number of  
8 insects to try and deal with and try to control.

9 So even though we have got 72 per cent --  
10 or reduced the population by 72 per cent, we still had  
11 a very high degree of defoliation in 1988. 70 per cent  
12 defoliation versus 74 per cent in the untreated area.  
13 And the difference there being that the one area in  
14 Arrow Lake had twice as many insects -- more than twice  
15 as many insects per 18-inch tip than the corresponding  
16 area, the white spruce block, Bedivere Lake, Block W.

17 Q. Now, are these results good?

18 A. Overall I would say they were good,  
19 but the one example I was just talking about there,  
20 Arrow Lake, the white spruce trees that were surveyed  
21 where we had 70 per cent defoliation, I would not class  
22 that as a good result.

23 THE CHAIRMAN: Why did you get a zero  
24 population reduction in the last one?

25 MR. CHURCHER: That could very well be

1 explained by the point that Mr. Martel raised, that  
2 when we went back at the end of the feeding after the  
3 spray treatment, that both the two lines in those  
4 graphs were at the same point.

5 So it would appear that we had not killed  
6 any insects due to spraying, but in actual fact we did  
7 protect some foliage. It was 49 per cent defoliation  
8 versus 65, so one could assume that we did kill some  
9 insects. Just the sampling procedure does not  
10 necessarily show that.

11 MR. FREIDIN: Q. Mr. Churcher, earlier  
12 in your evidence you made reference to the importance  
13 of the timing of your spray, trying to find the optimum  
14 time or spraying at the optimum time.

15 Is there any information on page 209  
16 which demonstrates the importance of timing your spray?

17 MR. CHURCHER: A. Yes. Again, that's  
18 the reason for including column No. 2, the spray date.  
19 And if we look at -- once again to go back to Bedivere  
20 Lake, Block W that was sprayed in early June, compare  
21 that to the very last location that's listed there, the  
22 one the Chairman just referred to, Sibley Provincial  
23 Park, white spruce, we see that Sibley Park wasn't  
24 sprayed until the middle of June.

25 So that would have been getting towards

1 the end of the spray window as opposed to the beginning  
2 of the spray window, which may also be a good reason  
3 why we didn't kill that many insects and why there was  
4 a fair amount of defoliation, 49 per cent defoliation  
5 compared to 69 per cent in the check block; there  
6 wasn't that much difference between the two.

7 Q. Okay. Are there any results reported  
8 in a similar format for chemical insecticides regarding  
9 the percentage of defoliation?

10 A. Since we haven't used insecticides  
11 aerially in Ontario since 1984 there is certainly  
12 nothing as up to date as this. The only other place  
13 where they would be reported in a format similar to  
14 this, specific to Ontario, would be in a paper that was  
15 prepared by Howse, Nicolson and Meiting, that covered  
16 the period 1979 to 1938. And it looks at the use of BT  
17 in Ontario and compares it to the use of chemical  
18 insecticides in Ontario in programs -- control programs  
19 for the spruce budworm.

20 Q. Could you comment on those results  
21 and, in particular, the comparisons between chemical  
22 and BT?

23 A. Their conclusion -- they came up with  
24 three or four final conclusions.

25 The first one was that there was

1 essentially no difference in the results that were  
2 obtained between BT and chemicals in that five-year  
3 period, that both BT and chemical gave very similar  
4 results in terms of foliage protection, keeping in mind  
5 of course the objective there is to protect foliage,  
6 not kill insects.

7                   However, they also concluded that at that  
8 time BT was slightly more costly than chemical  
9 insecticides.

10                   I should add that since 1983 when that  
11 paper was written the cost of BT has continued to  
12 decrease and the cost of chemicals has risen somewhat,  
13 so the difference that they have cited in '83 is  
14 probably less so now.

15                   They also note that chemical insecticides  
16 were easier to handle; in other words, it was easier to  
17 mix them and load them into the aircraft. Again,  
18 through recent developments in BT formulations and our  
19 knowledge of dealing with BT, it now is probably as  
20 easy to handle and deal with this chemical insecticide.  
21 We no longer need to mix our BT at all, we just load it  
22 straight into the plane and spray it undiluted or neat.

23                   And they also concluded that the  
24 perception was that there were fewer environmental  
25 effects with the use of BT than with chemicals. Those

1 are the four major conclusions they came up with.

2 As a final comment, I guess I would say  
3 that what they are saying is that you may get more  
4 consistent results with chemicals on a year-to-year  
5 basis, but generally speaking overall the results that  
6 you obtain from BT or chemicals tend to be very  
7 comparable. They are equally effective.

8 Q. Is it your professional opinion that  
9 BT can replace chemicals in all situations?

10 A. No, that's not my opinion at all.

11 Q. And perhaps you could provide some  
12 reasons?

13 A. Well, first and foremost, as I noted,  
14 BT is effective only on those caterpillars that  
15 eventually grow up into moths and butterflies.

16 There are some insects, such as the saw  
17 flies I mentioned, or beetles or aphids, for that  
18 matter, that BT is totally ineffective against. For  
19 most of those we have no biological alternative.  
20 Again, as I indicated before, the only other biological  
21 insecticide that is registered and available for use is  
22 the virus for that one specific saw fly.

23 So when we are faced with some of these  
24 other insects we really have no choice. If we need to  
25 use insecticides, we would have to use a chemical

1 insecticide.

2 Secondly, there may very well be times  
3 and situations where even when we are dealing with  
4 spruce budworm or gypsy moth or some of these insects  
5 that are susceptible to BT, conditions and  
6 circumstances may be such that BT may not be effective  
7 or may not be as effective as a chemical insecticide  
8 could be. And in those cases, then we would need to  
9 use or we would have to use a chemical insecticide.

10 And in those cases then the conditions  
11 that we have talked about before in the policy where a  
12 biological can be used, if it is as cost effective,  
13 that condition would not be met. It might be as costly  
14 to use the BT, but it would no longer be as effective  
15 as the chemical alternative.

16 Q. Mr. Churcher, if I can refer you to  
17 page 106 of the witness statement.

18 MS. CRONK: Sorry?

19 MR. FREIDIN: Page 106.

20 MS. CRONK: Thank you.

21 MR. FREIDIN: Q. That is in a section of  
22 the report entitled Insecticide Use in Ontario and  
23 there is an indication that the Ministry has used BT  
24 only in its spray programs since 1985 and indicates  
25 that there are three reasons for that.

1                   It is the second reason that I want to  
2       direct my question to. It says that:

3                   "The second reason was because it..."

4       Referring to BT:

5                   "...was equally effective as chemical  
6                   insecticides against the pests requiring  
7                   treatment at the time."

8                   And is that statement contradictory to  
9       your answer that there are times, places and  
10      circumstances where chemicals would be required?

11                  MR. CHURCHER: A. No, it is not  
12      contradictory. What I am saying on page 106, at the  
13      time, in 1985, and subsequent to that BT generally has  
14      been as effective as chemicals or it was believed that  
15      BT, by and large, was going to be as effective as the  
16      chemicals.

17                  I think I also indicated that in the  
18      proposals that were presented in 1985 there were some  
19      situations that chemicals were proposed because it was  
20      felt that the chemicals would be more effective than  
21      the BT would have been.

22                  And subsequent to the Minister's decision  
23      in 1985 to only use BT, many of those blocks that were  
24      slated for treatment with chemicals were dropped and  
25      they were not treated whatsoever.

1                   So the statement on page 106 refers to  
2                   the time period being 1985 and then subsequent to that,  
3                   but I still believe that there are times and there may  
4                   be times in the future and circumstances where BT will  
5                   not be as effective on these pests.

6                   Q. Mr. Churcher, could I have your  
7                   professional view as to whether there are any risks in  
8                   limiting or restricting the use of insecticides to  
9                   non-chemical ones in all situations?

10                  A. Yes, for those reasons I gave, that  
11                  some insects are not susceptible to chemicals so,  
12                  therefore, restricting insecticide use to strictly  
13                  non-chemical then ties your hands, ties the forest  
14                  manager's hands. He would not be able to use or not be  
15                  able to control certain insects in certain situations  
16                  with the use of insecticides when indeed the use of  
17                  insecticides would be deemed necessary.

18                  Q. Could we go back to the page where  
19                  Table No. 6 is found.

20                  A. Page 209?

21                  Q. Yes. If we look at the right-hand  
22                  column in relation to the second location on Arrow  
23                  Lake--

24                  A. Yes, that would be the white spruce  
25                  block.

1 Q. Yes.

2 A. Yes.

3 Q. It indicates a high population  
4 decline in the second last column but a high  
5 defoliation, or putting it another way, you had good  
6 kill but you had poor results in terms of defoliation  
7 protection?

8 A. Yes, that's correct. We killed 72  
9 per cent of the insects, if you will, but we still had  
10 70 per cent defoliation in the spray block versus 74  
11 per cent outside of the spray block.

12 Q. And in the third last location, that  
13 is the Bedivere Lake, Block W, the white spruce, you  
14 have the opposite sort of situation where you have, in  
15 the second last column, the low kill, but you have got  
16 fairly good results in terms of defoliation protection.

17 A. That's correct. In that case we  
18 only -- it would appear that we only killed 20 per cent  
19 of the insects due to treatment, but we still ended up  
20 with reasonably good foliage protection of 26 per cent.  
21 Only 26 per cent of the foliage had been lost as  
22 compared to 60 per cent outside the block.

23 Q. Now, have you explained why those  
24 types of inconsistencies can occur?

25 A. Keeping in mind the graph that we

1 started out this section with, the first case, the  
2 Arrow Lake block I think, as I may have indicated, that  
3 even though we killed 72 per cent of the insects we had  
4 50 caterpillars running up and down our forearm.

5 We killed 72 per cent of them, there was  
6 still a number left that would be able to sustain that  
7 amount of damage to the branch. In the second example  
8 you raise, the Bedivere Lake, Block W, it would appear  
9 that we only killed 20 per cent due to the insecticide  
10 side usage, but we still ended up with very little  
11 foliage. That could be as a result of the timing of  
12 the survey similar to the point that the Chairman had  
13 raised of where we got zero per cent defoliation. That  
14 could be an artifact of the sampling, or it could also  
15 be a very high level of mortality in the unsprayed area  
16 or the check block due to natural predators and natural  
17 controls.

18 For whatever reason the damage was not  
19 done which would indicate that the caterpillars were  
20 not there or were not feeding.

21 MR. FREIDIN: Mr. Chairman, I have a few  
22 more questions on this topic before going to the last  
23 one. I don't think it will take me very long tomorrow  
24 to complete this examination.

25 I think, perhaps having regard to the

1 time of the day, it's been a longer day than we all  
2 anticipated, I would suggest that we adjourn for the  
3 day.

4 THE CHAIRMAN: We are about ready to  
5 expire, it's a good idea.

6 Okay, thank you very much. We will start  
7 at 8:30 tomorrow.

8 ---Whereupon the hearing adjourned at 5:10 p.m., to be  
9 reconvened on Thursday, June 8th, 1989, commencing  
at 8:30 a.m.

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